



FRIDAY, MAY 17.

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Contributions.

The Master Car Builders' Coupler.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your editorial in the issue of the *Railroad Gazette* of May 3, upon the subject matter of certain communications appearing in your columns and in those of the *Car Builder* on "Standard Couplers" covers the ground so fully that any elaboration in the way of argument would be useless.

I have hesitated about entering into any newspaper discussion (or into what might appear to be a discussion), but my scruples in the matter are overcome by the consideration that there are many railroad officers deeply interested in the general subject who have no other means of arriving at a knowledge of the true state of the case than by such information as I give below. I address myself particularly to the assertion over the signature "New England" in the May issue of the *Car Builder*, that "the Master Car Builders' type of coupler has been in service and tested, and pronounced by practical men as dangerous and weak in construction, as all the swivel head vertical hook couplers are. Although comparatively few are in service the call for parts for repairs is steadily increasing, and many of the large railroads advocating and voting for this type of coupler, after a thorough trial, have abandoned its use on account of the grave disadvantages encountered, and would now vote against its use."

I of course have no knowledge of the identity of "New England," but the *Car Builder*, while not indorsing all his statements, vouches for him editorially as "a prominent Eastern master car builder, * * * who is in a position to exercise considerable influence on future action about couplers." This may be a proper estimate of the gentleman's influence, but if a correct or even an approximate knowledge of the progress of affairs in the line of his profession be a criterion by which to judge the fitness of any one to exercise an influence in the councils of his associates, his letter would justify a doubt as to whether "New England" should be adjudged as being even near to the standard required. I submit the following statement of facts, and leave to those interested the task of forming conclusions:

During the four months from Jan. 1 to May 1, 1889, the Janney coupler has been supplied in the following quantities for new cars for the railroads indicated, viz.: The system comprising the New York Central, the Lake Shore & Michigan Southern, the C., C., C. & I., and the Michigan Central, 3,350 couplers; Pennsylvania Company's lines (west of Pittsburgh only), 3,000; Richmond & Danville (cars now under construction), 2,000; Atlantic Coast line, 350; Burlington system, 600; Total, 9,300. This includes only "round lots."

To sum up in a general way, and to give a comprehensive idea of the progress which the M. C. B. coupler is making, a statement of the increase in applications of the Janney coupler may be epitomized as follows: The applications during 1888 were six times as great as those of 1887. The applications during the four months of 1889, just past, have been ninety per cent. of the total applications for 1888.

If "New England" doesn't wake up to a realization of the fact that a very considerable acreage in this country is west of the Hudson River, the procession will move off and he will find himself "left."

If "New England" would like to know how slight a foundation he has for the charge of weakness, etc., of the M. C. B. coupler, he can be gratified in so far as relates to the Janney coupler only by application to WM. McCONWAY.

PITTSBURGH, Pa., May 8, 1889.

MAY 9, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice in your issue of May 3 a letter from a gentleman in Chicago who writes over the signature "X," taking up the question of standard couplers. The gentleman who has written the article is evidently ignorant of the fact that for the past fifteen years all the passenger and freight cars in this country, whether coupled with links and pins or with the Miller or Janney coupler, have, by the action of the Master Car-Builders' Association, been so arranged that the

draw-bars are exactly the same height from the ground on all of the roads in the country. The gentleman is evidently laboring under the idea that no such uniformity of action has yet taken place, because he says "the poorest form of coupler now in use, if applied to all the cars in the country, and placed at a standard height, would do more to solve the main point, i. e., safety, than all that has been accomplished in the improvement of link couplers, and the adoption of the automatic coupler by all the railroads and commissions." The want of a uniform height, or a standard height, seems to be the only idea in his article, and yet, if he knew anything about railroad practice, he would know that the days when the crooked links were needed on railroads have passed away long ago.

I have no idea the Inter-state Commerce Commission will undertake to manage the question of standard couplers. Several of the states in the Union have taken the matter into their own hands, and have passed certain laws; and now, if the United States Government should undertake to make one general sweeping rule in regard to that subject, it is evident that the only result would be that confusion would be heaped on top of more troublesome confusion.

I have been very hopeful that the recommendation of the Master Car-Builders' Association, in regard to the standard coupler, would be adopted by all the roads in the United States, but I very much regret to say that only a few roads have taken any action on the subject. If all the roads should decide to do away with the link and pin coupler, and adopt the vertical plane coupler, it would probably require five years to make the necessary change, during which time confusion would prevail. The writer of the article to which I refer has probably felt that such is the case, because he harps on the adoption of a standard height, evidently without knowing that the standard height for draw-bars was fixed by agreement many years ago.

I believe the Inter-state Commerce Commission has too much sense to enter into a subject which is involved in so much doubt and uncertainty. Many of the different states have taken a hand at it, and will probably continue to enact laws in regard to it. Some of the states through which our own system of roads is located have fallen into the error of believing that they can manage the railroads in their states better than the owners of the railroads can manage them. Take Mississippi, for instance, a state which needs even more railroads. In that state a Railroad Commission fixes the tariff on passenger fares. It also fixes the tariff for freight rates; it locates depots; it designates the kind of depots that shall be built; it requires union depots to be built at junction points; it designates the number of waiting-rooms, and decides how they should be occupied by the different races; it determines upon the number of water-closets and the size thereof; in fact, it runs the railroads of the state entirely, with the trifling exception that it does not make the time-tables nor the pay-rolls, nor does it raise the money to pay off the pay-rolls and the other operating expenses. With these two exceptions the Commissioners of Mississippi operate the railroads of that state; and yet the capitalists of New York and Europe, after knowing that that state has kindly provided a board which will operate their railroads for them, seem to be timid about building any more railroads in Mississippi. This is singular and yet it is true.

GENERAL MANAGER.

Eye-bars.

PITTSBURGH, Pa., May 13, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with some interest Mr. Gaynor's paper in your issue of the 10th inst. One thought occurs to me in connection with Mr. Gaynor's statement "that iron eye-bars made by our leading bridge companies, under close inspection and careful tests on the part of the engineer, are more unreliable members than any of the rolled or built shapes used in any other part of the bridge."

The tendency of the present time is towards the use of steel eye-bars. This tendency is evinced by the large amount of capital invested and now going into plants for the manufacture of steel eye-bars. It is more than probable that steel will eventually supplant iron for this purpose. For the purpose, however, of drawing out if possible, some views from engineers who have had experience in the construction and especially the maintenance of iron bridges, I will make two assertions.

First: That iron eye-bars have proved reliable and satisfactory for practical use in bridges, and that they have not failed in service; that is, not in the ordinary service of a bridge.

Second: That iron eye-bars are to-day the most satisfactory tension members for bridges of spans not exceeding 200 ft., for the reasons (a) that they have been well tested in service and found satisfactory; (b) that the increased weight of the iron eye-bar over the steel eye-bar is favorable to the bridge of ordinary span as above, as it gives to the structure greater inertia to resist vibration caused by passage over it of live loads; and (c) that we have not to-day positive evidence that no structural change occurs in steel eye-bars under heavy service, especially when they are of comparatively light section, while we have recent evidence of the breakage of forged steel members of bridges in ordinary shop handling.

S. D.

Burnt Clay Ballast.

CHICAGO, May 9, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the interesting article in your issue of May 3, entitled "Stone Ballast in India," the process of the manufacture of burnt clay for ballast is described with statements as to practical results in using it as ballast for railroads.

The writer of that article shows that there was no economy in its use, and that such ballast had almost entirely disappeared from the best managed roads in India.

The methods of burning clay as practiced in India and in this country are widely different. In the first place the American practice would condemn a clay that was not plastic enough when first dug to be used, instead of mixing it with water and forming into balls and then drying in the sun before placing on the pile to be burnt. To make the best quality of burnt clay a much fatter clay than ordinary brick loam should be used; clay that for brick requires the addition of sand and also that has a small percentage of lime in it in order the more readily to be vitrified. Clay that requires no additional sand for making brick is too coarse in texture to vitrify into masses.

The writer intimates also that it was very difficult to get good practice in burning from the native contractors as they were too careless in working the clay well and also in using the proper quantity of coal. The indications are, in fact, that in India the clay used was poor in quality, and the process of burning very inefficient; that the clay should have been denominated baked clay, for further on in the article he says that he noticed ballast that had been in track five years had largely turned to clay, also that it destroyed the ties and even had an injurious effect on fish plates and rails and that grass grew in it more readily than in stone ballast.

Burnt clay can never return to anything like its former condition as the chemically combined water in vitrifying is entirely dissipated and will not enter into chemical union again, whereas when merely baked, only a portion of this water is driven off, thus not entirely destroying its plasticity on the addition of water.

In this country extensive use of burnt clay has demonstrated that it is durable, elastic, free from dust, more economical in transportation, cheaper to handle in every way, and costs only about one-half the expense for labor in renewal of ties and maintenance generally, over broken stone. It is remarkable for prevention of growth of vegetation.

But care should be taken to get the proper quality of clay and, further, large experience and a peculiar process must be adopted to secure good returns. The clay must be thoroughly burnt or vitrified and not baked or partially burnt. Where properly manufactured universal satisfaction has been the result in using it in this country.

BURNT CLAY.

Professor E. Winkler.

DEPARTMENT OF CIVIL ENGINEERING,
MASSACHUSETTS INSTITUTE OF TECHNOLOGY,
BOSTON, May 11, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

On the 27th of August last occurred in Berlin the death of Prof. Emil Winkler, Professor of Bridge Building in the Royal Polytechnic School. Prof. Winkler was well known to many engineers in this country, both personally and by his writings, which covered a wide field and treated very exhaustively of certain subjects. In Germany he was recognized as one of the leading authorities on bridges. To those who knew him personally he endeared himself by his kind but unassuming spirit, and his staunch and steadfast friendship, and he commanded their admiration by his devotion to his profession, his untiring energy and perseverance, the range and thoroughness of his attainments, and his almost limitless capacity for work. He had for many years, however, overtaxed his strength without knowing it, and was finally brought at the age of 54, to an untimely end, just when his experience and knowledge were of the greatest value.

A movement is now on foot to erect a bust of Professor Winkler as a memorial in the Polytechnic School with which he was so long connected. I beg to call the attention of your readers to the opportunity which is now before them to contribute toward a memorial to this distinguished man, believing that those who have known him either personally or through his writings, and who have experienced the enthusiasm which he infused into all who knew him, will only need a knowledge of their opportunity in order to take advantage of it.

Contributions, however small, will be thankfully received, and it will undoubtedly be a gratification to those who have the matter in charge to be thus assured of Professor Winkler's standing on this side of the Atlantic. Contributions may be sent to Ernst & Korn, Wilhelm strasse, 90, Berlin; or to Herrn Reichenburgstrath Hoffmeister, Königl. Tech Hochschule, Berlin-Charlottenburg. If preferred, the undersigned would also be happy to remit any amounts which are sent to him.

GEORGE F. SWAIN.

"Plums."

TO THE EDITOR OF THE RAILROAD GAZETTE:

Didn't one of your correspondents a few weeks ago ask for a vocabulary of railroad terms? If so, will not somebody explain the mystery about this new word "plum"? I have seen it several times lately. It occurred in Mr. Chauncy M. Depew's testimony before the Fifth Avenue Hotel committee as applied to Canada, and now I find it in one of your editorials as applied to the Chicago terminals just secured by the Northern Pacific. Both these instances refer to cases whose value (preserved) is to come some time in the future; should we therefore call "plums" "canned fruit"? (Question respectfully referred to the Classification Committee, Mr. C. E. Gill, Chairman, 346 Broadway, New York.)

Then a plum has a pit which in eating we have to look out for; fatal instances of swallowing it are on record. Is it so with a transportation "plum"? If so, where and what is this pit as applied to the aforesaid terminals or to Canada?

If we could have this important subject carefully defined and described, who knows how much anxiety we might save those who like plums but can't distinguish between the fruit and the pit?

PLUMMER.

Greater Freedom to American Roads.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your editorial upon the Competition of Canadian Railroads must meet with general approval. The conclusion that "the committee, if they modify the law at all, should do so in the direction of giving greater freedom to American roads rather than of putting greater restrictions upon the Canadian ones," is so sound as to need quoting. Before your editorial appeared I was called before the Senate Committee, and while there the question was asked me, What can be done? As the newspaper reports were very indefinite permit me to give briefly the discussion which arose.

I suggested that the Commission apply, when necessary, to roads competing with American lines that have Canadian connections the same exception to the long and short haul clause which they have permitted to roads competing with water routes or with foreign roads wholly outside of the jurisdiction of the Commission. Senator Platt advanced the objection that such exception made to the Northern Pacific would have to be made also to the Union Pacific, and thus compel a readjustment of all trans-continental traffic. To this assent was given, with the caution that the exception should be allowed, of course, only after examination of all the facts, and then only when the competition was manifestly unfair and injurious—a mere differential not being proof enough. Also that such readjustment would be the same as now against water carriers. Several senators here remarked that there were no violent exceptions to the long and short haul because of water competition; that the clause was very nearly or quite lived up to. In proof of my illustration, a number of instances were given the committee, such as the first class rate from New York to New Orleans, 70 cents (just raised from 55 cents), as compared with \$1.14 New York to Atlanta, etc. In fact the tariffs of the southern roads are full of such violations, tacitly passed upon by the commission recently. It will be noticed that this proposition would not require any amendment to the present law. Since the *Railroad Gazette* favors something of the kind I am more than ever inclined to look upon the suggestion with favor.

THOS. L. GREENE.

Bridge With Solid Plate Floor.

We show herewith some details of a short span bridge with solid plate floor, as recently built on the line of the New York Central & Hudson River Railroad. This bridge crosses the Erie Canal at Rome, N. Y., but it is a type of a class of short span bridges which the New York Central has recently adopted. The construction of the bridge is so clearly shown in the illustration as to require no description. It will be noticed that the end post is not only very heavy in itself, but is braced by a substantial strut, making it very stiff to resist a blow from a derailed locomotive or car. This particular bridge is 98 ft. 5 $\frac{1}{2}$ in. long, double track, and built on a skew of about 54 deg. The opening spanned is 90 ft.

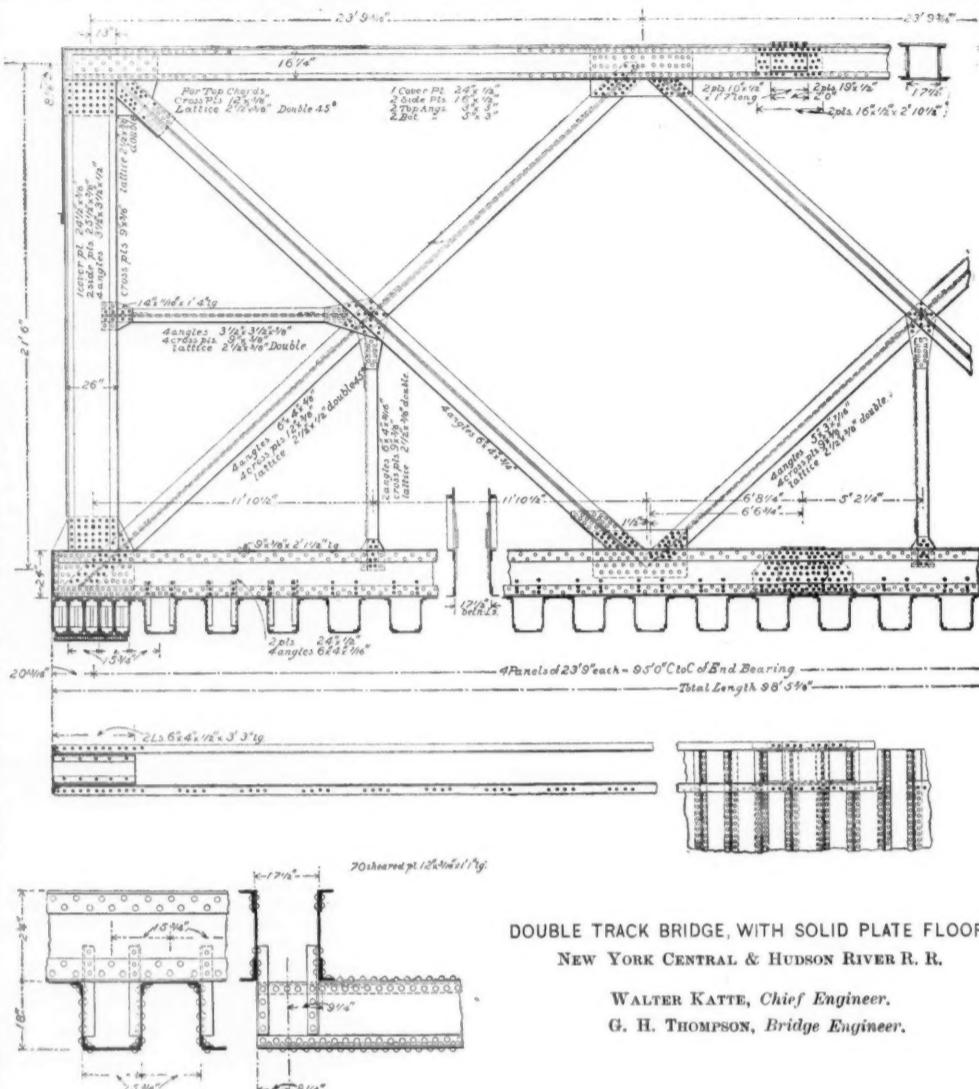
The thickness of the bridge floor in this case was limited by the street grade at the end of the bridge and by the regulations as to head room over the Erie Canal. The lowest line of the floor is 12 ft. above the water, and the base of the rail is 20 in. higher and 2 in. above the floor. The ties are 8 x 8 in., laid in small stone ballast in the troughs. Drainage is provided for by $\frac{1}{4}$ -in. holes in the plates. The floor plates are treated with a soft asphalt coating, being immersed in the asphalt in vats for 30 minutes, at a temperature of 300 deg. F. The floor weighs 1,600 ft. per lineal foot.

The portals are of solid wrought-iron plates; the rest of the structure of open-hearth steel of a tensile strength of 65,000 lbs. per sq. in. All the steel was inspected at the mills. All holes were drilled except in the portals. The drilling of the rivet holes in the chords and pieces was done at one operation, and all the work came together with a close fit.

The mill weight of this bridge was 161 $\frac{1}{4}$ tons. The contractors were the Hilton Bridge and Construction Co., Albany, N. Y.

A New Driver Brake Arrangement.

The driver brake arrangement shown herewith is one which the Eames Vacuum Brake Co. have been experimenting with during the past year. It has been applied to a con-



DOUBLE TRACK BRIDGE, WITH SOLID PLATE FLOOR.
NEW YORK CENTRAL & HUDSON RIVER R. R.

WALTER KATTE, Chief Engineer.
G. H. THOMPSON, Bridge Engineer.

siderable number of locomotives having six and eight drivers. One of the noticeable features in the results of the actual use of this brake is the uniformity of brake shoe wear. By actual measurement it is found that the brake shoes on all wheels last about an equal time; the small variations of thickness do not correspond to any arrangement of the shoes but appear to be purely accidental.

The novelty in this brake is the method of equalization. In appearance it resembles an eccentric with two centres; one attached to the brake shoe, the other attached to a rod leading to the succeeding brake shoe in the system. The strap which surrounds the disk bears on the front side of the disk only; that is, on the opposite side to the point where the rod is attached. The result is that the movement of the engine passing over low places, or the natural movement of the disk with regard to the strap, produces a rolling movement of the disk on the strap, which takes place with little or no friction. The strap is made slightly larger in diameter than the disk. The disk contains two bearings, and the power applied to the strap is divided between these two bearings in proportion to the distance of the centres of the bearings from the centre of the disk. These distances are in the following ratios: 3 to 1 in the rear disk, 2 to 1 in the middle disk and 1 to 1 in the forward disk. The brake blocks are supported in the line of stress by wrought iron brackets attached to the upper part of the frame.

Among the advantages claimed for this brake arrangement are: Perfection of equalization for any number of wheels and for any amount of variation in the thickness of the shoes, and a minimum number of parts, with simplicity, accessibility and ease of repair. The tie bar passes through both the disk and the strap and, therefore, it is almost im-

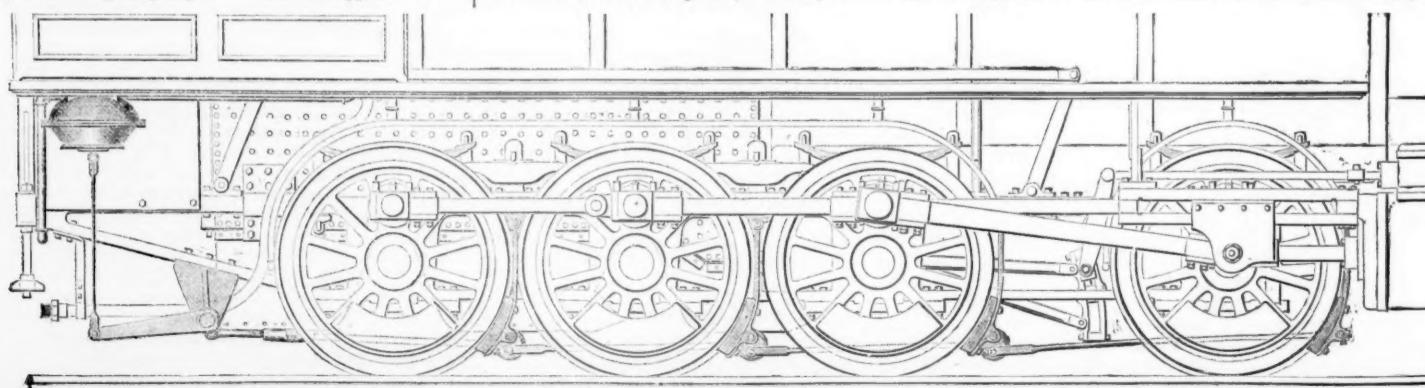
possible for it to fall down. For this feature is claimed increased safety over other devices of the kind.

The Eames Brake Co. are paying considerable attention to the manufacture of this brake, and in order to render all parts more durable, they are made integral to a great extent. All parts are made of wrought iron without welds. One commendable feature of this brake arrangement is that principle of construction which allows the equalizer to move in a plane parallel to the motion of the brake shoes. This brings the axes of all the pins and bearings of the entire system parallel and the wear is, therefore, on the entire length of the bearings at all times. Not the least important of the advantages of this brake arrangement is that of minimum weight.

Two Rail Sections.

In our issue of Feb. 1 we showed a 70-lb. rail designed by Mr. W. B. W. Howe, Jr., Chief Engineer, Savannah, Florida & Western. Mr. H. S. Haines, General Manager of the Plant System, has sent us a blue print of the section as finally adopted, which we reproduce here, together with illustrations of the joint. The changes made in the section since we illustrated it are rather immaterial, and the principle upon which the rail was designed remains unaffected.

Mr. Haines says that this section is offered to the public as an additional contribution to the discussion of the subject of rail sections. It was the idea of the designers of this section to provide a rail of greater stiffness without greatly increasing its weight. With the same height and base for a 70-lb. rail that other railroad companies are using for an 80-lb. section, and the same material in the head that they used



EQUALIZED DRIVER BRAKE.
EAMES VACUUM BRAKE CO., New York.

tions, other than railroad companies, or that are not cared for or controlled by a railroad company, etc.' Now in connection with this rule comes in rule 27, which says: 'In rendering bills cars shall be treated as belonging to railroad companies whose name or initials they bear.' What I wish to call the attention of the Committee to is this: We find in rendering bills that are running over our road a large number of cars marked with the initials of different railroads that are put on these cars by the consent of the road, but the road whose initials they bear has no interest whatever in the cars, and says that the mileage is paid to the private parties."

In other words, they repudiate the bills; they say the cars do not belong to them. Now, here is a rule which makes it obligatory to send the bills to those parties, and they refuse to pay them.

"It seems to me that Rule 27 conflicts with Rule 11, and I hope you will give it your attention, as it has been some trouble to us; the railroad companies say they do not own the cars, and it is very difficult for us sometimes to find out who does own them. It is evidently a simple dodge to compel railroad companies to make repairs that actually and properly belong to private companies, who do not reciprocate in the interchange of cars and consequently take no risk."

"Rule 10 makes a road liable for wrong material, and very properly so, generally, but I think an exception should be made in regard to box lids or covers. This seems to be the sentiment of the various clubs, as far as I can learn."

If a box is put in with a different style of lid on it, but uniform in every other particular, and returned to the owner, he may say the box is wrong on that account. Everybody knows that the cover is unimportant, so far as interchange is concerned. I was present at a Buffalo club meeting some months ago, where this question came up, and it was voted by that club that the box lid should not have anything to do with making the box acceptable; in other words, if the box conformed except the cover, and everything was properly fitted, that should not be an objection to receiving the car.

"If the cover is not the standard of the road it should not be objectionable, provided the box conforms in other respects, and the key, brass, etc., is uniform. This needs attention and alteration."

"I also think that under the circumstances cars should be allowed to pass with a good, reliable draw-bar, at least until there is a reasonable amount of cars equipped with the so-called standard bar."

There is a point I think important to be inserted in our rules, that if the bars are sound and reliable, of sufficient size and strength, they should not be objected to. I would not object to any pattern of the ordinary old style, the link pattern. I would not like to have an automatic bar put into our cars, and I don't suppose it would be done, as they are more expensive.

After I had written this letter to Mr. Casanave, I wrote to Mr. Rhodes, the President of the Western Railway Club, calling his attention to these matters, and asking him if they would not discuss them in their Club, and I see that at their meeting of April 17, they had quite a discussion on these points to which I have referred, and it simply shows how much difference of opinion there is among the men who make these rules, and if they don't agree it is not to be wondered at that our inspectors do not.

I see that there is a society in Chicago called the Car Foremen's Association, and the question of the interchange of cars at Chicago was discussed at one of their recent meetings. They have a great many cars to interchange at Chicago, perhaps more than at any other point in the United States. In a paper read at that meeting by Mr. E. J. Trudeau, he claimed that Rules 4 and 6 are badly abused, and I think he is right about it. Rule 6 reads: "Any company finding a car with defect card attached may make repairs noted by the card, provided such repairs are necessary for safe running of the car, and render bill for same."

Now, it would seem that if the car was safe to run, the card simply noted a defect that did not interfere with its safety, and one man will decide that it ought not to be stopped for repairs; but the next man understands that he is permitted to stop that car and repair it if he finds it empty, and he repairs it and sends the bill to the party putting the card on, which the rule allows. Some men will not let a car run over their road with a card attached without stopping it for repairs. That is not the intention of the rule or the design of the card; the object of the card is to carry the car through to its destination. This article to which I refer seems to charge some roads with making a specialty of repairing cars that come into their hands with cards on them. They are not like our road, because we don't want to do any more than we are obliged to, and what we do we do because we believe honestly that it is for the advantage of ourselves and also of the company owning the car. Of course some judgment must be used as to whether the car will reach its destination safely without repairs, whether the defect will not increase so as to render it unsafe, and whether a repair now would not save a much more expensive one later.

At the meeting of the Western Railway Club of April 17th to which I referred, there was quite a discussion of the question which I presented in my letter, concerning how much of a piece should be broken out of the flange of the wheel to change the term *chipped* to *broken*. Now it seems to me there should be a positive, fixed, definite size of piece that shall be broken from the flange to constitute it a broken wheel any make it a chargeable wheel. Chipped flanges are not chargeable. They are supposed to be occasioned by running over a bad frog. It is not an infrequent thing to find a piece broken out five or six inches long, and if it is broken so badly, it looks to me that the wheel ought to be chargeable. I don't know that we can get any proof that frogs will break chunks out of a wheel five or six inches long; it might be a question.

Mr. MARDEN (Fitchburg): There is no doubt that rule 6 is abused, and I think the remedy for it is to have two cards, one for new defects and another for old defects; and I think the company that owns the car should be held responsible for old defects on that car. We have found our system of line inspection between Boston and Chicago has been of great benefit in this matter; that is, instructing the inspectors over different roads in a uniform method of inspection, so that they understand what is required on the different lines. The difference in the size of axles gives us a good deal of trouble. We have what is known as the Master Car Builders' standard axle, $4\frac{1}{2}$ in. in the middle, and a large number of cars have axles of this size; 25 or 30-ton cars require an axle $4\frac{1}{2}$ or $4\frac{3}{4}$. When these axles are changed, smaller axles, of less diameter, are frequently put in, especially if the matter is not carefully watched.

In Rules 19 and 20 the matter of wrong material is spoken of, especially as applied to draw bars. I agree with Mr. Adams in this matter. We have trouble every day under those two rules. We have given our inspectors instructions to receive no Fitchburg car that has not a good strong draw-bar. We find that makes a saving for us. When the car arrives at its destination, if we choose we take the bar out and put in our own type, and hold that bar to put into a car where it belongs. Our bar is a strong reliable bar, a link and pin bar. We have had trouble in cases where we have broken the patent devices which are used on some roads, and replaced them by our own bars. When such a car gets home

they will take out our bar and put in their patented one and charge us \$15 or \$16 and allow us for scrap. We have refused to allow the bills, particularly with one road, refused to card their cars, and they have referred the matter to the Arbitration Committee, and we have agreed to abide by their decision and to card the cars.

In regard to wrong box lids, when the matter of standard oil boxes was brought before our national association, and especially when it was up for adoption, I suggested that if the oil box itself was a standard any lid might be used. That idea has not been accepted fully, and many roads have refused to receive cars with wrong box lids.

I have thought for many years that our system of interchange was very expensive, necessitating much clerical work, and that we might sometime in the future have something better. It seems to me that it would be no more than fair that we should take care of the repair of the cars belonging to our road, whether they are on our road or on other roads; the mileage we get for our cars on other roads should pay us for depreciation.

Mr. ADAMS: Mr. Marden alluded to the matter of old defects. How do they arise?—a cracked sill for instance; somebody broke it, perhaps six months ago, our own cars are sometimes gone for a year, and come back say with one or two broken sills; they were sound when they left, or they wouldn't have been taken on the New York Central. Now, if it can be ascertained who broke that sill, that party should pay for the repairs. I wouldn't take any cars with old defects; I would make the rules so that cars shouldn't be passed with old defects. If all the cars needing repairs were stopped and the repairs made, the matter would soon regulate itself, and the question of old defects would vanish. I would vote to-day in the National Association for a rule which provided that every car not in thoroughly good order should be stopped, as that seems to me the only way to remedy the existing difficulty.

Now, with regard to box covers, a good many are laboring under the idea that our rules require a cover of certain dimensions. I do not so understand them. I was one of the committee who got up those plans and patterns, and no special cover was adopted. The "Master Car-Builders' cover" is frequently alluded to in the papers, but there is no such thing; and if a box has a good cover that shuts tight it should not be thrown out, and in order to obviate any trouble under this head, I think the rule with regard to repairs with different material should be changed.

Mr. LAUDER (Old Colony): I should hardly accept Mr. Marden's view that these interchange rules are burdensome and that something better can be devised, because I think we can get along with just the rules we have now, with perhaps some slight amendments in regard to minor points. These rules are the growth of years, devised by the best minds in the business, and are recognized as just and fair all over the country, and I should regret to see any effort made in the Master Car Builders' Association to overturn them. I think the difficulties in their application will be met as they have been before, and we shall continue to make them a little more perfect as we go along from year to year. I think, as Mr. Marden does, that it might be an advantage to have another kind of card, such a card as will pass the car along without its being an order for repairs, and this I think would correct some of the little evils which now exist.

Mr. ADAMS: The reason that Mr. Lauder is so well satisfied with the rules as they are is that his road is quite differently situated from ours and others which have through line connections. I presume we get fifty bills for interchange where he gets one. While the rules as a whole are excellent, and are the result of long experience, I think they require some modification. I should be opposed to materially changing or doing away with the system, because as a whole it works very well.

One matter which I referred to in my opening remarks has not been touched upon by others; that is the habit of putting the cars of private companies into service with the initials of roads to which they do not belong upon them, which roads refuse to pay the bills accruing upon them under the interchange rules. If we put in a wheel in place of one that is broken we expect to get paid for it, and we want to know who owns the car. This matter ought to be arranged, so that the responsibility for those cars shall be fixed where it belongs, and there shall be no trouble in collecting bills properly arising against them.

Mr. LAUDER: I have always thought that the prices laid down in the Master Car Builders' rules should not apply to private cars for labor and repairs, because those prices were made lower than cost; I believe that a private car should be charged not only what the job costs for repair, but a profit also, covering the use of tools, superintendence, etc. In the case of two railroads they can reciprocate, but where a private corporation comes in, there is no way for it to make up the balance to the road that does the repairs, which, if it charged the prices laid down in the rules, would be subject to a loss. Perhaps it would be well to incorporate an article in the Master Car Builders' Rules to the effect that cars having the name or initials of a road upon them shall be considered as belonging to that road, as far as making the bills for repairs is concerned.

Mr. ADAMS: The rules do say that.

Mr. LAUDER: Then I don't know why the roads whose initials are on private cars should not pay the bills and get the amount out of the owners of the cars.

Mr. ADAMS: I would make a motion that, as the sense of this club, all private companies, such as the Refrigerator companies, The Kansas Beef Co., and others of that character, should pay the cost price of all repairs, without regard to the prices now fixed by the Master Car Builders' rules. I agree with Mr. Lauder that these private companies should not be recognized as being governed by the rules as they are; I claim that they have no right to assume that the rules apply to them; but they do so, as we know by experience in dealing with them. I think they should be debarred from the privileges given to the roads by the rules.

Mr. FLETCHER: Let us see if there are not two sides to this matter. It is said that these private companies have no rights. But I observe that you apply the rules to these companies in other cases. If you take a car from them in good order and break it up by accident, you repair that car and want to charge it to the owners; you do the same with a railroad. Why do you do that? Isn't it a one-sided affair all through? If they send cars to you unsound you have a right to reject them, and you will every time. If you break them, is it right for you to repair them and charge them for it?

Mr. MARDEN: I want to say a word more about the rules. I feel satisfied with the rules, but they need revision occasionally. The difficulty in their application is that our inspectors do not understand them alike; they cannot agree whether a car with a certain defect in it is safe to run or not. Therefore I should be glad to see some different arrangement if it could be made equitable on all the roads.

Mr. LAUDER.—The remedy will be to build some standard inspectors. I hope the Master Car Builders' Association will pass some vigorous resolutions with regard to these purely private companies who own cars stamped with the initials of some road, so that the responsibility for repairs to such cars shall be definitely fixed that there shall be no trouble in collecting the bills for such repairs. If the roads which allow their names to be put on private cars will assume the repairs to such cars, that will cure the difficulty now existing.

Car and Tender Trucks.

At the last meeting of the Northwestern Railroad Club Mr. Wm. McIntosh, Division Master Mechanic Chicago & Northwestern, read a paper on tender trucks. He pointed out the diversity in construction, and suggested that a standard would be useful. Further he said in substance:

I think there is a general tendency toward providing greater capacity of tenders, particularly as regards the quantity of water, which is a move in the right direction. This will reduce the number of stops to a minimum, and in Western countries, where the water supply is often limited and of poor quality, will allow the passing of water stations furnishing noticeably bad water, thus resulting in less wear and tear to machinery and a corresponding increase in the life of flues and fire-box sheets, which would far more than counterbalance the disadvantages of increased load.

I presume the equalized, centre-bearing truck, with swinging bolster, would be the favorite with most mechanics, and it no doubt embraces the best mechanical points. But it has such a variety of parts that its theoretical perfection is somewhat clouded by wear on hangers, equalizers and other members. In practice it does not possess the many advantages claimed for it over the wooden transom truck with the large springs resting on the journal boxes. And in this connection I would inquire, is there a better place for the spring to rest, providing of course that allowance is made for the necessary freedom of motion? Having had considerable experience with this type of truck, and knowing that it is capable of doing good service, I am unwilling to permit its condemnation without saying a word in its favor. I am aware that it is lacking in mechanical perfection; yet its simplicity of construction, freedom from breakage, nominal cost of keeping in repair and the easy accessibility of all its parts are points in its favor. Flange wear only results from faulty construction or neglect of ordinary repairs; the same trouble would be encountered from the same cause with the most elaborately constructed device. I think with a few improvements this truck can be made to give as good results as any in use. I would suggest a rolling contact between top of spring and upper pocket, and that the bottom of spring rest on an inverted clutch hanger suspended on a pin passing through sides of lower pocket. I recently noticed an arrangement of this kind on a Green Bay & Minnesotta engine, and consulted M. M. Fenwick regarding its merits. He informs me that it is a decided improvement on the sliding contact; also that it is not patented and is free to the public.

About the only move toward uniformity in the construction of tender trucks is the adoption of the M. C. B. axle by the Master Mechanics' Association, and this axle has proved itself admirably adapted to the service. Not many years ago, on the divisions with which I am connected, the largest tender truck journal was $3\frac{1}{2} \times 5\frac{1}{2}$ in., and hot-boxes were common enough. Then the engines were changed from wood to coal burners, and with the heavier loads on tenders hot bearings were of daily occurrence. Later, axles $3\frac{3}{4} \times 6\frac{1}{2}$ were substituted, and trouble in this respect greatly reduced. Now we have the M. C. B. axle under our heaviest tenders and in all new trucks, and a hot bearing is rarely encountered. I cannot call to mind any serious objection to adopting a truck of one common standard for either cars or tender. Such an arrangement would effect a large saving to railroads by reason of the reduction in quantity of material required in stock and by the cheapened construction and repairs—having but one instead of many different kinds of trucks to make and keep in order.

At the same meeting was submitted a paper by Mr. W. T. Reed, of the Chicago, St. Paul & Kansas City. He considers swinging trucks for freight cars necessary on roads of considerable curvature for the following reasons. (1.) Side motion provides to a great extent against sudden pressure being brought to bear against the outer rail on curves and other contingencies in track which present themselves after heavy rains. (2.) There is reduced pressure against flanges of cast wheels, which is an important feature with us when the temperature is low through the winter months. (3.) There is obtained easier lateral motion to body of car, and hence less shaking up of stock and other important freight. (4.) It has been found necessary to have easy side or lateral motion on passenger coaches, which is provided for in the truck; and what is good for the passenger coach must necessarily be applicable to the freight car.

In regard to tender trucks, many have found it judicious to locate weight on front truck entirely centre bearing and on rear truck side and centre bearing, and especially where side bearers are spread so that spring stands directly over arch bars. The idea is to prevent as much as possible the surging of water in the tank. The outer elliptic spring on the rear truck taking care of the rocking motion, it would necessarily follow that a tank would ride steadier, especially when trucks are close together, as against trucks a distance apart. I have found fewer tank trucks of this type leave the rail on rough track than any other. Friction or stop blocks should be arranged for with sufficient clearance, and so as to be of service in case of a broken spring. Elliptic springs are preferable to spiral for tender trucks. For a tender having a tank of 3,000 gallons capacity I would recommend the same size journal and axles as for freight cars, as above mentioned. Also, I would recommend steel-tired wheels for tender trucks of locomotives used in passenger service.

The American Society's Committee on the Form of Rails and Wheels.

The Committee of the American Society of Civil Engineers issued under date of March 18 a circular asking for specific expressions of opinion as to the conclusions reached by the Committee in its preliminary report, which is published in the *Transactions* for July, 1888. A supplementary circular is issued, dated April 20, as follows:

The Committee desire to supplement their last circular, which showed only one section (fig. 1, herewith), by submitting with it two other sections, the three together being typical of all the varieties of practice which exist. You will greatly aid the Committee in the work of preparing a final report (especially if you have not yet answered the first circular) by answering briefly the following questions in regard to each of these sections. The preliminary report of the Committee, giving all the facts which they could collect, and the preliminary conclusions which the facts seem to warrant, was published in the *Transactions* of this Society for July, 1888.

Please state if you approve or not the following features of the rail section shown in fig. 1 (a lately adopted standard of the Michigan Central Railway):

A. The $\frac{1}{2}$ -in. corner radius? B. The 12-in. top radius?

C. The vertical sides? D. The very small lower corner radius? E. The broad head relatively to depth?

Do you approve or not of the following features of the rail section shown in fig. 2 (the standard of the Lehigh Valley Railroad)? A. The $\frac{5}{8}$ -in. corner radius, identical with a similar fillet radius for the inner corner of the flange? B. The 10-in. top radius? C. The decided flare of the sides? D. The high and large head relatively to base?

Do you approve or not the following features of the rail sec-

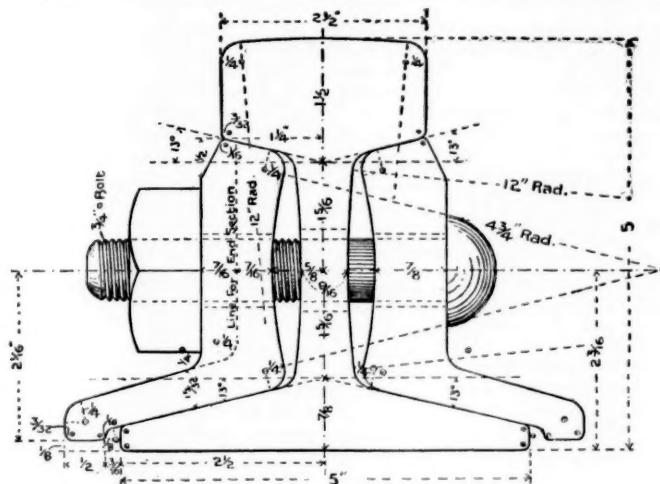


Fig. 1.

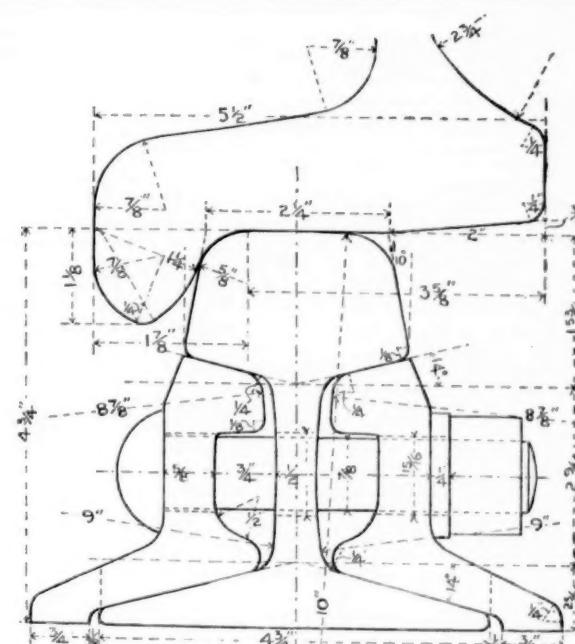


Fig. 2.

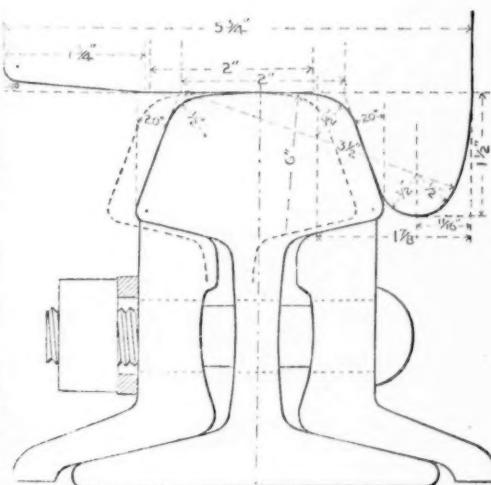


Fig. 3.

tion shown in fig. 3 (the standard of the Cumberland Valley Railroad*)?

A. The corner radius identical with fillet radius of wheel? B. The extension of the identical form of rail and wheel to afford bearing contact over the entire side of the rail and inside of flange, instead of over a part only? C. The general form of the head?

Those who have not answered the previous circular of March 18 are again asked to refer to the preliminary report of the Committee and answer the following questions in regard to it. The Committee cannot properly prepare a final report without a full expression of the views of those who are interested in this important question.

(1.) Do you consider that the evidence submitted in the Committee's report, published in the *Transactions* of the Society for July, 1888, together with your own experience and observations, warrants accepting as final conclusions the preliminary conclusions as to causes of sharp flanges, outlined, etc., at the foot of page 28? If not, please state your objections.

(2.) Do you consider, on the same basis of fact and personal experience, that the preliminary conclusion as to rail-wear stated near the bottom of page 35, "that the rate of rail-wear grows very materially greater as the rail corner is rounded off to fit the fillet of the flange," may properly be accepted as a final conclusion? If not, please state your reasons.

(3.) Do you consider that the engravings on page 38-9, with your own observations and experience, warrant the conclusion that worn rails in service take a top radius of about 12 in., seldom much less or more, and a corner radius of about 1/4 in., or somewhat more? If not, please state your conclusions.

(4.) Do you regard as warranted by the evidence the preliminary conclusions stated in the two paragraphs at the bottom of page 44? If not, why not?

(5.) Do you regard as warranted the preliminary conclusions as to fillet radius, on page 45, at the end of the report?

(6.) Mr. Don J. Whittemore, Past President Am. Soc. C. E., Chief Engineer of the Chicago, Milwaukee & St. Paul Railway, in paper, of which advance copies have been published by the Society, objects to any top curve at all, and proposes an entirely flat top between the rail corners. Do you deem this likely to be effective in reducing rail wear, and advise recommending an entirely flat top?

Answers to be sent to Committee on Rails, care John Bogart, Secretary American Society of Civil Engineers, No. 127 East Twenty-third street, New York.

Hearing Before the Senate Committee on Canadian Competition.

The Senate committee inquiry concerning the relations of Canadian roads to those in this country, which was reported in the *Railroad Gazette* of last week, was continued on May 9 and 10.

President George B. Roberts, of the Pennsylvania, thought that the Canadian lines certainly had an advantage under our present law. His road, however, had not suffered directly. It had felt the influence of the Grand Trunk, because any severe depression of rates affected all the lines to a certain extent. He would not claim that the Grand Trunk was acting incorrectly at present, but it had formerly caused the Pennsylvania inconvenience. So far as economy of traffic was concerned he felt that the Pennsylvania could compete with any other road between Chicago and New York. Canadian roads had an incidental advantage in being able to get material from England free of duty. They also obtained capital at a lower rate than American roads could. He thought it advantageous to the public that the Trunk Line Association should be sustained, as it insures publicity and stability of rates. The condition of railroad affairs had been bettered since the passage of the Inter-state Commerce law. Evasion of the law is still practiced; this should be expected, as the government suddenly thrust a great change upon the conditions of doing business. Some law should have been enacted long ago. The time was certainly ripe for some sort of government control. The Canadian roads should be subject to the same law as American roads with which they compete. He could not see why an exception was made in favor of Canadian railroads as against coastwise steamers. In the last resort it may be wise to exclude Canadian roads entirely. The United States should subsidize American steamers so as to make competition with Canadian Pacific steamers more nearly equal. The old pool cost a great deal of money and did not fully serve their purpose. They tended to increase construction of com-

* The committee is in error regarding this section. It was proposed by Mr. James A. Millholland, General Manager George's Creek & Cumberland Railroad, in a communication to the *Railroad Gazette*, printed April 13, 1888. It is now in use on that road but not on the Cumberland Valley.—EDITOR

petitive lines. If the United States Government took a more paternal interest in the roads; if the state governments should act in a more friendly manner toward them, and if capital might be diverted from building unnecessary roads, the railroads of the United States would prosper more. He was not prepared to admit that legalized pooling was advisable. Pools tended to prevent the natural development of railroads. He preferred well-regulated competition under proper laws to any form of combination. The Pennsylvania had for years been subject to the long and short haul law in the state of Pennsylvania.

President W. C. Van Horne, of the Canadian Pacific, stated that, excluding coal, the business of his road originating in the United States was inconsiderable. The differentials which that road enjoyed were principally on passenger traffic. The freight brought by it from San Francisco was chiefly hides and wool for Boston. Senator Culom produced a statement showing that the Canadian Pacific had received \$215,000,000 in land and money subsidies from the Canadian Government. Mr. Van Horne criticized the items of this statement and would not admit that the total should be nearly so large as stated. The Asiatic trade had constantly increased, and is sufficient to keep a line of monthly steamers in operation. An arrangement had been made with the Government by which a mail line would be constructed as soon as the contract should be signed. The road was getting about 10 per cent of the entire transcontinental traffic at present. The proposed steamers would make 17 1/2 knots an hour, and would be fitted with port-holes in order that they might, in case of necessity, be used as war vessels. The amount of the subsidy was \$300,000 a year. They hoped to land passengers from London in Yokohama in 21 or 22 days. That would be a saving of at least 10 days over the other route by way of the Suez Canal.

The earnings per ton per mile of through freight on the Canadian Pacific last year were 1.02 cents. Rates in Canada had been graded to meet the requirements of the Inter-state Commerce law. The greater part of the freight brought by this road for Chicago was from trans-Pacific countries and Alaska. The Canadian Pacific had never regarded the American lines as competitors in Asiatic trade. The business in that direction secured by this road had been taken from the Suez Canal route. The Canadian Pacific could make three days better time between China and London than the lines via San Francisco. The Canadian Pacific complied fully with the requirements of the Inter-state Commerce law without giving rebates. West of Lake Nipissing the subsidy received had been \$35,000,000. This was less than the amount received by the Northern Pacific. Nineteenths of the rolling stock of the Canadian Pacific had come from the United States. The company was not more closely allied to the Canadian government than the Pennsylvania road with the government at Washington.

John Newell, President of the Lake Shore & Michigan Southern, said his road had suffered from competition with the Grand Trunk. Much of the success of that road had been due, he thought, to violation of the Inter-state Commerce law, and he promised to furnish documentary evidence to this effect. The Inter-state Commerce law would prevent violation of agreements if enforced. Legalized pooling is desirable.

H. B. Ledyard, President of the Michigan Central, testified that his road was unfavorably affected by the competition of the Grand Trunk. Local rates in Canada were much higher than in the United States. He was certain that the Grand Trunk paid rebates in many instances. The Michigan Central had lost most of its foreign trade because of the subsidizing of vessels sailing from Portland, Me., in connection with the Grand Trunk. The Canadian roads should not be allowed to alter rates from points in the United States without notifying the commission, but local rates in Canada do not concern American roads. Competition among American roads would keep rates down even if the Grand Trunk were eliminated.

Much of the evidence of all the railroad officers in this hearing has been substantially a repetition of the views expressed by the men whose testimony was first reported, and has, therefore, been largely condensed.

On May 10, Charles S. Smith, President of the New York Chamber of Commerce, testified. The long and short haul clause he believed injurious to the interests of the country. It had decreased exports and retarded the development of the West. The balance of trade in favor of this country had steadily decreased for 8 years, and last year it was \$28,000,000 against us. Pooling should not be absolutely prohibited. Shippers could deal with a commissioner more conveniently than with a number of individual roads. The Government should control pools, however. Canadian lines were of great advantage to cotton mills in Maine, taking their goods to Chicago for the same price it cost to take them to New York.

J. H. Herrick, ex-President of the Produce Exchange, said that since the passage of the Inter-state Commerce law the condition of the merchants had improved, but the naming of cheaper rates for export traffic than for that destined to the seaboard only was destructive to commerce.

J. D. Kernan thought pooling should be allowed to some extent. He inclined to think the present law allowed the railroads all the legitimate advantages they had before it was passed. It should be tested some time yet. The Canadian roads remained in the pools only while traffic was good. The long and short haul clause of our law was too strong a measure.

The committee will meet in Boston, July 5.

The Paris Exhibition.

Engineering (London), for May 3, contains a very full account of the buildings of the Exhibition, with details of the organization, classification, etc. From this paper the following notes are extracted:

The buildings occupy the Champ de Mars, the site of the Exhibition of 1878, but considerably more ground is inclosed, covering the Quai d'Orsay and the Esplanade des Invalides. The Trocadero Palace and grounds which were also occupied in the former Exhibition, are included in the present inclosure. The general arrangement of the buildings, exclusive of restaurants, buildings erected by foreign governments, buildings representing the History of Human Habitation, and the like, is as follows.

On the Champ de Mars.—The Fine Arts Building, the

Palace of the Liberal Arts, the Galleries of Miscellaneous Industries, Machinery Hall, the Eiffel Tower.

On the Quai d'Orsay.—The Palace of Alimentary Products, the Agricultural Galleries.

On the Esplanade des Invalides.—Miscellaneous Exhibitions.

On the Trocadero.—The International Exhibition of Horticulture and Arboriculture.

It was estimated that the total cost of buildings and operation would be \$8,600,000, and that the receipts from the sale of admission tickets, concessions, etc., would be \$3,800,000, leaving a deficiency of \$4,800,000, for which provision was made by appropriations from the state and from the city of Paris. The estimated cost of the exhibition works was \$6,592,880, and the actual cost was \$5,886,395, or a decrease of \$846,485.

The Minister of Commerce and Industry is the General Commissioner of the Exhibition, and has under his immediate orders three Directors General, of Works, of Management and of Finance.

The prices of admission are fixed at 20 cents in the day time (except on special occasions, when the price will be 40 cents), and 40 cents at night, except on Sunday, when the charge is 20 cents. Season tickets, admitting the holder at all times, cost \$20 for the general public, and \$5.20 for members of commissions and committees. The catalogue is printed by a contractor, who engages to sell it at a price not exceeding 60 cents.

There are to be 85 juries, composed of French members appointed by the government and foreign members nominated by their respective commissions. The awards consist of the grand prix, gold medals, silver medals, bronze medals, honorable mention.

An interesting feature of the Exhibition will be the meeting of a number of congresses and conferences, at which important questions in the arts and sciences will be discussed by experts from all parts of the civilized world.

The constructions which present the most interest to engineers are the Eiffel Tower and Machinery Hall. Mr. Gustave Eiffel, the distinguished engineer who erected the tower, received a subsidy of \$300,000 and a concession allowing the structure to stand for 20 years as the property of the builder, after which time it will belong to the Municipality of the City of Paris. The upper platform of this tower is 896 ft. above the ground, and the structure is surmounted by a lantern whose top is at a height of 981 ft.

Machinery Hall occupies nearly the whole width of the Champ de Mars, and covers an area of more than 900,000 sq. ft., being composed of a nave having 375 ft. space and a length of 1,380 ft., with a gallery 57½ ft. in width on each side. The estimated cost of the building was \$1,300,000, and the actual cost \$1,502,785. The lateral galleries are divided into two levels by a floor at a height of 26 ft. 3 in. above the ground, access to the upper floors of the galleries being provided by large staircases. A vestibule, forming supplementary galleries, is constructed between Machinery Hall and the Gallery of Miscellaneous Industries. The dimensions of this pavilion or vestibule are 98 ft. 5 in. by 120 ft. 8 in.

The roof of Machinery Hall is constructed of steel, the form chosen being that of a subsided spiral, the curve being composed of arcs of circles and straight lines. Each girder weighs 196 tons, except those at the gable ends, which each have a weight of 240 tons. Each girder contains about 32,000 rivets, 19,600 being closed up at the works, 10,300 on the ground, and 2,100 on the scaffolding. There are three elevators in the building, one ascending to a height of 150 ft., and the other two carrying passengers to the upper galleries. Test pieces of the steel used in construction were subjected to a tensile strain of 15.24 tons per square inch for 10 minutes; then additional loads of 0.32 ton each were added until the specimen was ruptured, it being specified that the breaking load should not be less than 27.94 tons per square inch, with a reduction in cross-section of at least 40 per cent., and an extension of at least 24 per cent.

The work of painting this immense structure was accomplished on traveling platforms, suspended by grooved pulleys from tightly-strained wire ropes. By this means about 165,000 sq. ft. of surface was painted by 30 men in 18 days at an average height of 115 ft. above the ground.

The classification of Mechanical Industry and Electricity, forming the exhibits of Machinery Hall, is made under 19 general heads, comprising Group VI.: Material and processes employed in mining and metallurgy; material and processes for rural and forest industries; material and processes for agricultural and food industries; material used in the chemical arts, in pharmacy and in tanning; general machinery, including prime movers and steam generators; machine tools; spinning and cord-making machinery; weaving machinery; tailoring machinery; material and processes employed in the production of houses and furniture; paper-making and printing; miscellaneous machines; carriages and wagons; railway material, including cars and locomotives; electricity; civil engineering, public works and architecture; hygiene and public health; navigation and life-saving apparatus; the art of war.

There is a supplementary department in the classification of Retrospective Exhibition, devoted to collections of tools, processes and products representing the practice of early times, as well as the progressive improvements made in the various branches of art and industry. This exhibit is divided into five principal sections: Anthropological and ethnographical; the liberal arts; arts and industries; means of transport; the art of war.

The Retrospective Exhibition of Means of Transport includes: Transport by road; transport by water; transport by railway; transport in the air. Many valuable models,

drawings, photographs and actual machines have been collected for these exhibits, among which may be mentioned locomotive No. 1, built by George Stephenson, of Newcastle-on-Tyne, in 1825, for the Stockton & Darlington Railway Co.; an original coal-wagon and a portion of the original permanent way used by the same company; an original Trevithick locomotive, and full-size model of the "Rocket," and many specimens of old rails. Numerous models of early sailing vessels and steamships have also been collected; it is expected that the exhibit of Means of Transport will be of peculiar interest on account of the fact that the International Railway Congress is to meet in Paris this year.

The lighting of the Exposition grounds and buildings by electricity at night was undertaken by the French Chamber of Electrical Industries, on condition that the charge for entrance in the evening should not be less than 40 cents, and that one-half of this should be given to the syndicate. It was determined not to attempt the illumination of the whole of the Champ de Mars, but to confine the lights to the central garden and other open spaces, the nave of Machinery Hall, the Central gallery in the Miscellaneous Industries Courts, the vestibules at each end, and the side galleries occupied by restaurants and the like; the area to be lighted amounting to 3,706,000 sq. ft., and calling for an amount of light equivalent to that of 3,000,000 candles, or about 4½ the amount of public lighting throughout Paris. It was calculated that about 3,000 horse-power would be required for this work, and 1,000 horse-power additional in motors and dynamos is kept in reserve. Should it be decided to open the palace and grounds of the Trocadero at night they will be lighted by gas. The Champ de Mars is lighted by 1,150 arc lamps and Jablachoff candles and 10,000 incandescent lamps; in Machinery Hall there are 286 arc and 730 incandescent lamps, and there are many lights for luminous fountains and other special illuminations.

Power is furnished free to exhibitors of machinery in motion. The steam required for driving motors and for other purposes in Machinery Hall is furnished by exhibitors of steam generators and paid for by the Administration at the rate of \$23.18 per boiler horse-power (rated by the evaporation of 30 lbs. of water hourly per horse-power) for 7 hours a day during 180 days, which is the official period of the exhibition, with extra allowances, should steam be required for more than 7 hours a day or for more than 180 days, and a diminished rate per horse-power for all evaporation exceeding a fixed amount. The boilers are placed in a row of separate buildings outside of Machinery Hall, and are furnished by eleven manufacturers from France, Belgium and England. The working pressure of steam varies in different boilers, from 85 to 128 lbs. per square inch, and the rated capacity of all the boilers in an hourly evaporation of 40 tons of water, which amount will probably be increased to 50 tons in practice.

There are 4 lines of main shafting in Machinery Hall, with a total length of about 4,500 ft. The diameter of the shafts is 3.51 in., except at the points where the main driven pulleys are located, the diameters at these points being increased to 5.51 in. The shafting is designed to transmit 75 horse-power for each span of 39 ft. 6 in., and the speed of each line is 150 revolutions per minute. There are 28 independent sections of shafting, any one of which can be coupled to the adjoining section by means of a sleeve, so that in the event of a temporary break-down of the engine controlling a particular length, the adjacent engine can be employed. There are in addition three short lines of shafting, driven by three engines, and 670 ft. of shafting, 2.17 in. in diameter, in the Agricultural Galleries, driven electrically from Machinery Hall. All the shafting was rented to the Administration by thirty contractors, who oil and inspect it, being paid \$3.90 per running foot for seven hours a day and 180 days, with allowances for over-time.

The shafting is actuated by 32 steam engines, rated at 5,500 horse power, and furnished by manufacturers from France, Belgium, England, Switzerland, Alsace and the United States. The actual power required is expected to be about 2,600 horse-power. Each exhibitor furnishes all valves, steam pipes, etc., required for his engine, together with the pulley and belt for the line-shaft, and is paid at the rate of \$8 per indicated horse-power, for 7 hours a day and 180 days, with certain deductions in the rate for the production of power beyond a specified amount, and allowances for over-time.

The steam and water mains, and pipes for carrying away condensed steam, in Machinery Hall, are laid in two subways, one having a length of 1,075 ft. and the other 587 ft., the cross section being 7 ft. 9 in. wide and 6 ft. 2 in. high. The steam and water mains each have a diameter of 23.6 in. in the longer subway and 15.75 in. in the other. There are manholes at intervals of about 14 ft. in each subway, and through these openings connections are made with the mains by supply pipes leading directly to the machinery for which the steam is required. Short subways lead to the boiler houses for steam and water mains. The steam mains in Machinery Hall are divided into six independent sections. The pipes from the mains to the motors are laid in subsidiary channels.

The columns carrying the line-shafts are connected by latticed girders, and two traveling platforms are mounted on these girders and moved by electric transmission. This will greatly facilitate the circulation of visitors throughout the vast building. The latticed girders were supplied by a contractor, in return for the privilege of transporting passengers at a fixed rate.

The water used in the boilers, and for other purposes, is pumped from the river Seine into the mains by two plants; one furnished by a French contractor, and consisting of a Wheelock engine driving a double acting Girard pump; the

other being the well-known Worthington pumping engine, having a capacity of 6,500,000 imperial gallons per day. Worthington pumping-engines are also used to actuate the hydraulic elevators of the Eiffel Tower.

Foundation Brake Rigging, P. R. R.

The accompanying illustration shows the foundation brake gear adopted by the Pennsylvania Railroad for its four-wheel passenger coaches. Brake shoes are applied to both sides of all wheels as shown. The brake beams are of iron of the Westinghouse type. The various pressures and length of levers are given in the cut.

One great advantage of a gear of this kind is that the brake-beam pressure is much reduced. With the same total brake-beam pressure on the wheel the pressure per beam is reduced to one-half the amount existing when only one beam is used per pair of wheels. There are other advantages which are readily called to mind by the illustration, not the least of which is the almost perfect balance of the pressure upon the wheels. The brake levers are arranged on the Hodge system nearly, the difference being in the duplication of brake-beam levers on the trucks.

Brooklyn Bridge.

At a recent meeting of the Board of Trustees of the Brooklyn Bridge the report of the committee appointed to prepare plans to increase the terminal facilities of the Brooklyn Bridge was unanimously adopted and authority given to purchase as much as necessary of the surrounding property. The estimated cost of building the New York terminus, including the cost of the land, is about \$400,000.

The plan adopted is essentially that shown in the *Railroad Gazette* April 27, 1888. There are to be two cables and four tracks, the additional tracks to be overlapped with those now in position, making a "gauntlet" on each side of the bridge. At the terminals the incoming tracks diverge to pass on either side of the unloading platform. After unloading the trains pass on to tail switching tracks, from which they are sent out to two sides of the loading platform. By this system two trains can be loaded and two unloaded nearly simultaneously, and loaded trains pass no switches. Provision is made by stairways for passengers to enter and leave the platforms without crossing any tracks. We shall publish drawings and a detailed description of the proposed terminals in a later issue.

THE SCRAP HEAP.

Notes.

The Baltimore & Ohio announces through sleeping-car service between New York and Cincinnati, Chicago and St. Louis.

The Union Pacific has placed dining cars on the line between Chicago and Denver, the cars being those lately used in the defunct Golden Gate Special.

A dispatch from Chicago says that, owing to the fact that work in the Pullman shops is slack, it is reported that about 1,200 employees have been laid off, or about 25 per cent. of the regular force, and that the wages of others have been reduced. This action, it is said, is only temporary, as several large contracts are coming which will give employment to the full force.

It is announced that the Georgia Southern & Florida will endeavor to advertise the virtues of the country through which its road runs by establishing a model farm. This is expected to not only be the means of spreading information in the North and elsewhere concerning the products which can be raised in Georgia, but to teach new ideas to the farmers in that region.

The enormous business of the New York elevated railroads during the celebration of April 30 necessitated the running of 3,382 trains on the main lines daily. The average daily number of trains on this road, exclusive of the three short branches, is 2,700. The average daily train-mileage on the main lines is about 21,000; during the celebration it was 27,185. The number of trainmen in service was increased from 877 to 1,221.

Fast Lake Steamers.

Last week we reported the run of the Union Line steamer "Owego" from Buffalo to Chicago in 58 hours. Since then the "Chemung" of the same line has made the run in 57 hours 50 minutes, and the "Oswego" in 55 hours and 18 minutes. This beats the best previous record.

TECHNICAL.

Car Notes.

The Kansas City, Wyandotte & Northwestern has placed an order for 3 new locomotives, 100 box freight cars, 3 cabooses, 2 chair cars and 2 combination passenger coaches.

The Louisville, New Orleans & Texas has recently received 4 new passenger coaches, and 6 others are nearly completed. An order will soon be placed for a large number of freight cars.

The Litchfield Car & Machine Co. is building for the Belleville & Southern Illinois (Cairo Short Line) 150 fruit, 50 refrigerator, and 50 box cars. The 18 passenger coaches for the Union Pacific recently offered to the St. Charles Car Co. have been let to the Litchfield Car & Machine Co.

The Burton Stock Car Co. has contracted to build at its Wichita shops a "perfected" palace horse car for C. J. Hamlin, President of the American Glucose Co., of Buffalo, N. Y. The car will be for private use, and will be used for the transportation of his 16 horses, valued at \$250,000. The car will be equipped with passenger trucks, steel wheels, Westinghouse automatic brake, Muler and Janney interchangeable buffers and monitor roof.

Bridge Notes.

Proposals are wanted until June 10 for the construction of a bridge across the Mississippi River at St. Cloud, Minn.

The contract for the steel viaduct for the Denver City Cable Railway Co. has been awarded to the Wrought Iron Bridge Co. of Canton. The viaduct will be 3,028 ft. long and 40 ft. wide, and will require for its building 1,000 tons of steel structural work and over 1,000,000 ft. of lumber. The contract price is \$135,000.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

It would be easy to treat too seriously the recent attacks made directly and indirectly on the Master Car-Builders' coupler. We look on them rather as the expiring kick of the link-and-pin than as an expression of any widespread feeling against the vertical plane coupler. There is little likelihood that the Master Car-Builders' Association will stultify itself by abandoning any part of the position which it took last year on the coupler question. The patient and skillful work that it did and the action which it finally took commanded the respect and confidence of the most enlightened among the higher officers of the railroads. The Association's solution of this very complicated question in mechanical engineering did a great deal to establish a high technical reputation for that body. That reputation will undoubtedly be carefully guarded. Still, assertions like that quoted by Mr. McConway in his letter, which appears in another column, if left undisputed, would unsettle the opinion of some, and the figures that he gives showing the progress made in the application of the M. C. B. coupler will help to brace up those who think that the Master Car Builders could, if they tried, "bring this automatic coupler question to a sudden collapse."

The hearing held the other day by the Railroad Commissioners of Connecticut on the subject of car-heating was an illustration of the expensive, inconclusive and unscientific method of getting to the bottom of a technical problem so often adopted by such bodies. A number of men more or less interested came before them, at considerable sacrifice of time and money, and gave *ex parte* opinions which, on the face of them, could be of no value whatever in determining whether or not continuous heating of trains should be made compulsory by a law of the state. What each man said could have been exactly foretold by any one who has kept the run of the subject. From what was said the Commissioners could not, nor could any one else, form any just notion of the mechanical nature and difficulties of the problem, or of the degree to which it is met by the various devices offered. Among other matters offered in evidence was a quotation from an interview with Mr. Depew, shortly after the blizzard of 1888, in which he is reported to have said that the experience of his road in that storm proved that there must be stoves in the cars. In fact, the operating and technical officers of the Central said exactly the contrary after that memorable experience. This is hardly a fair specimen of the hearing, but as a contribution to knowledge, the rest of the testimony was worth little more. Any intelligent engineer could have taken the published data and discussions on train heating by steam from the locomotive, and after a few hours' study could have made a report to the Commissioners which would have summed up comprehensively the existing knowledge and present practice in a way to enable them to draw conclusions of some value. His

fee would doubtless have been less than the cost of this hearing; besides, in the investigation made the Commissioners did not "get anywhere."

A recent press dispatch states that all but one of the passenger conductors on a Western road of considerable consequence have been discharged. The account gives no reason, but it may be assumed to be the melancholy one which is the basis of most of the other news items of this kind, which seem to appear with discouraging regularity month after month. After all the discussion which we have had on the subject of the dishonesty of conductors, the injustice of discharging men without good reason, and the evils and perplexities of the detective system, it does not seem supposable that intelligent and honorable superintendents would discharge passenger conductors by the half-dozen without feeling sure of their ground. It must, therefore, be concluded that the wholesale discharges every now and then reported are, in the main, just; that officers making them have been forced to such action by overwhelming evidence. While we do not purpose just now to discuss this disgraceful phase of railroad operation, we wish to call attention to the profound contrast suggested by an incident recently related of an old conductor on a well-known Eastern road. This conductor, who now holds another position on the same road, which he has faithfully served for many years, was recently told by one of the older officers of the company that he (the conductor) could readily have taken from the cash fare collections, during his service as conductor, fifty thousand dollars, and yet have kept his returns fully upto the average of those made by the other conductors running at the time. Moreover, we see here a likeness as well as a contrast. The news item above mentioned implies that there was one honest man among a dozen, more or less. The Eastern road referred to had at the time probably 25 conductors, and the remark quoted seems to indicate that 24 of them must have been rated at one dead level of deviltry.

Standards in Car Construction.

At the last meeting of the Northwest Railroad Club was read a paper on tender trucks, by Mr. Wm. McIntosh, Division Master Mechanic of the Chicago & Northwestern, and one on freight car trucks by Mr. W. T. Reed, of the Chicago, St. Paul & Kansas City. Mr. McIntosh called attention to the increase of weight of tenders owing to the largely increased water supply carried, and also corroborates the statements made at the Western and other railroad clubs that the swing motion truck as at present constructed is expensive to keep in repair. This coincides exactly with the almost unanimous expression at the Western Railroad Club recently during the discussion of a paper on the subject, read by Mr. Jno. Hickey, Superintendent of Motive Power of the Milwaukee, Lake Shore & Western.

Regarding the desirability of using a swing motion truck for general freight car service, opinion is much divided; but there is little dispute as to the necessity for such trucks under stock cars and locomotive tenders. As suggested by Mr. Reed, the swing truck has been found necessary under passenger coaches, in order to reduce the shocks and sudden side motions; therefore, in order to carry live stock with the least possible damage, it is quite necessary that all steps be taken to render the cars as flexible and as comfortable as possible within reasonable limit. Stock cars, then, may be furnished with swing motion trucks, even if they are more expensive to keep in repair, without exceeding the demand of the most rigid economy. The same may be also said regarding the use of swing motion trucks under locomotive tenders, as was pointed out by Mr. Godfrey W. Rhodes, at a recent meeting of the Western Railway Club. (See *Railroad Gazette*, March 1.)

So far then the field of usefulness of the swing motion truck is clear and well-defined. In regard to general service, however, there is no opportunity to make such satisfactory conclusions. If one is to form opinions, regarding the necessity for swing motion trucks under the average freight car, from the avowed experience of those who have had the most experience with them, then a satisfactory decision is impossible because of the wide diversity of opinion. Mr. Reed sums up the reasons for the general use of the swing motion truck as follows: (1) Side motion provides to a great extent against sudden pressures being brought to bear on the outer rail on curves, and at other points after heavy rains have caused the depression of the rails. (2) There is a reduced pressure against the flanges of the wheels, which is of great importance when cast-iron wheels are used, particularly during cold weather. (3) There

is an easier motion of the car and therefore, less shaking up of live stock and other freight. (4) It has been found necessary to have an easy side motion on passenger car trucks, and what is good for a passenger truck is good for a freight truck.

In opposition to this we hear from representatives of many miles of track, at the Western Railway Club, that they have discarded the swing motion truck for general freight service, and have returned to the rigid truck as being the most economical, and fully equal to all of the demands of service, stating further that, in their experience, they have found no increase of broken flanges due to the use of the rigid trucks. To reduce the cost of repairs, Mr. Reed suggests the use of a lateral motion truck which is not supported on swing links in the usual form.

While as a whole the subject is left by the papers and discussions, during the past three months, in a very undecided state, yet there is one unavoidable conclusion which can be deduced from it all, that is, the use of swing motion truck causes the cars to ride easier and will reduce the jars and shocks to the wheels, axles and car structures.

Mr. McIntosh's reference to the great saving which would result from an adoption of a standard car truck, both swing and rigid centre, deserves more prominence than it was given in his paper, and when the statement is extended to include freight car bodies as well, it is worthy of more attention than almost any other subdivision of railroad equipment. Sometimes it seems as if it were hard for a busy railroad man to appreciate the value of standards, yet in his daily life he is vexed and worried by the unnecessary diversity of dimensions of the devices which are under his care more than any other class of men in the world. A want of time for reflection is one of the conditions of railroad life, and it is this, without doubt, which prevents the full conviction of the value of standards from obtaining a firm grasp upon his mind. A simple estimate of the reduction of cost of time, labor and material which would follow the adoption of a standard freight truck would result in a gratifying reduction of expenses, but if in such an estimate be included the savings resulting from a standard car body, then the reduction in outlay for new material and cost of repairs would amount to an appreciable dividend on railroad stocks.

At the meeting of the Northwest Railroad Club, on April 5 (see *Railroad Gazette*, April 12), the short life of our present designs of freight cars and indirectly the value of standards was well brought out. It was then stated that the life of the average freight car is not greater than 8 years, and in the case of stock cars not over 5 years. When it is realized that there are in freight service some 1,000,000 cars which must be entirely renewed every eight years, and when we reflect that in all human experience hardly an example can be found of a structure in which the total outlay for first cost, renewals and repairs is not reduced by a system of exact duplication and uniformity of parts, the immense importance of standard forms for all parts of freight-car construction is evident, without any argument.

Yet, while it may appear from this that railroad officers have been and still are neglecting a great chance to reduce the cost of freight-cars per ton mile of paying load, yet that is not a true inference, because the adoption of a standard wooden car is not such a simple problem as it may at first seem. While iron and steel are the same the world over, yet the varieties of wood available in different localities are not, and, therefore, the great variation in strength and durability of the varieties of wood, whose cost and abundance render it available for car construction, necessitate a variety of standard dimensions to suit the available material. Again, the shrinkage of wooden stock and the liability of loss by fire reduce the advantages which might otherwise be gained by the adoption of standard wooden cars. It will not do to infer that railroad officers are greatly at fault because they do not rush in and adopt standard wooden freight cars. There are many sides to the question. But if the advantages of standards are not utilized soon after the wide introduction of metal cars then there may be more ground for criticism.

To-day but few metal cars are in use in this country, not so much because they are not desirable as for the reason that the shapes of metal most desirable for such construction have been obtainable only at a cost far above what the railroad companies would be justified in paying. In fact, it is doubtful if the advantages of metal cars would offset their cost when constructed in the manner which would be prescribed by railroad men to meet the demands of regular service. Such demands would include the use of special shapes of

metal, obtainable, until about a year ago, only at a cost so great as to almost prohibit their use. Now the cost of metals is greatly reduced; steel has become as cheap as iron; plates, angles and beams can be obtained of steel with a uniformity of strength and weight per running foot, in proportion to the ultimate strength, not previously to be obtained from wrought iron at any cost. Special shapes of large pieces of metal which will take the place of several smaller details can now be obtained at a cost which renders their use possible without exceeding the demands of close economy; and in addition to this we now have, as a precedent the successful introduction of iron and steel in freight car truck construction and the use of iron body bolsters in freight car bodies, and most favorable reports are received of the results of the trials made with metal car sills in foreign countries where the conditions are not unlike those in America. It is interesting to note here that an invoice of steel cars is soon to arrive in Mexico for use on the Vera Cruz line. From all this discussion of the various designs and desirability of standards, and from what seems to be a set of conditions favoring the more extended use of metal cars, one might draw two conclusions, viz.: There is a growing demand for and an increasing appreciation of the value of standards in freight car and truck construction; also that the result of experience in the immediate past and the changes in prices of material and methods of manufacture have brought about conditions which render possible a system of standards which in the past have been impossible to obtain.

International Interchange of Cars.

The question concerning the use (or abuse) of Canadian freight cars in the United States and of American cars in Canada, which has been considerably discussed in the newspapers and elsewhere for a few weeks past, appears to excite public interest, not because it is a very important question in itself, but because it has a political bearing. People short of other subjects to talk about gladly take up this. It appears that the occasion of the adverse decision of the Treasury Department and the cause of the consequent publicity was a very innocent transaction. About a year ago a shipper in Chicago, desiring to ship to Liverpool via the Michigan Central and Canadian Pacific via Montreal, ordered some Canadian Pacific cars. They were sent to Chicago, but on arrival there, on account of some change in the market, the freight was not shipped. The cars were there, however, and the Michigan Central had no business offering for the Canadian Pacific; but it had business offering for the Rome, Watertown & Ogdensburg road, and under an arrangement with that company and the Canadian Pacific it was at liberty to load Canadian Pacific cars for points on the Rome, Watertown & Ogdensburg, the cars being afterward delivered by the R. W. & O. to the Canadian Pacific at Prescott. These cars were so loaded, and the collector at Detroit took the position that, being Canadian-built cars, they could not be used for traffic between points in the United States via the Province of Ontario. On stating his position to the Secretary of the Treasury, he was sustained therein. The Michigan Central appealed, on the ground that the practice to which the exception had been taken had been in force for over twenty years. The treaty of Washington stipulates that traffic between the United States and Canada, or between points in the United States via the Province of Ontario, or via Montreal and St. Albans, shall be carried on under such regulations as the Secretary of Treasury may from time to time make. No regulations having been made, the present practice of the roads has grown to be a general custom. The Michigan Central therefore claims that the Secretary of the Treasury should have made explicit rules, which would have given the railroads an opportunity to conform thereto; he should not have imposed snap judgment by simply notifying the companies of the imposition of duty on certain cars. The same ruling was put into effect at Port Huron, but at no other Canadian frontier port has there been any question as to the use of Canadian built cars. Yet if the Canadian companies reaching Detroit and Port Huron have used cars wrongfully, the same error has, no doubt, occurred at every other frontier port, and a ruling which would be applicable at Detroit and Port Huron would certainly seem to be applicable at the other places.

The appeal of the Michigan Central has been heard by the Secretary of the Treasury, and his decision is now awaited. A large proportion of the Canadian cars used in trans Ontario traffic were originally built in the United States and taken into Canada. There

are not more than two or three car-building companies in Canada, and the result has been that the Canadian roads have bought largely in the United States, and have paid duty on the cars to the Canadian Government. This has given American car companies a good amount of business, and the welfare of this country, so far as this phase of the subject is concerned, apparently cannot be bettered.

The theory of interchange of cars is very simple. A road loads one of its own cars to a distant point on another road; that road discharges the freight and returns the car; returns it loaded if it has a load, empty if no load is available for it. If it can load the car a portion of the way back, but not the whole distance, that course is naturally taken. This rule has been universally applied without regard to international boundaries. The Erie, having a Grand Trunk car at New York can load it back to Toronto, or can load it to Elmira and send it thence to Toronto empty; the Grand Trunk having a Chicago & Northwestern car at Montreal can send it directly to Chicago empty, or can take it empty to Toronto and load it thence to its home.

On the organization of the Blue Line, one of the first of the co-operative fast freight lines, in 1869, the Great Western, now a part of the Grand Trunk, was the Canadian link, and it put in its quota of 200 cars into the line. The quota of each road was in proportion to its mileage and the cars were used indiscriminately. Theoretically, this was an impartial plan. Doubtless it is not actually equitable at all times, but whether this be so or not no one can under present conditions devise any means by which it can be made so. To require each car that crosses the line to be sent directly home by the same route it came would involve much unnecessary empty mileage. To require transfer of freight at the boundary line is entirely out of the question. Even if a correct account were to be made up showing the mileage of each country's cars in the territory of the other, the facts shown would be of doubtful value, and adjustments between companies would be endlessly complicated. If interchange is to be permitted at all, some leeway must be allowed. A Canadian car, sent with a load of barley from Hamilton to Boston over the New York Central, is not an equitable offset for a New York Central car sent with merchandise from Boston to Hamilton; and a Grand Trunk car loaded in Montreal for Jackson, Mich., is not a fair exchange for a Michigan Central car loaded in the opposite direction. The respective roads can settle their rights without difficulty, but the two nations have a more complicated problem.

The question concerning the Canadian Pacific cars above referred to is simply whether they can be returned by a route different from that which they took on the outward trip, and one of which a larger proportion lies in the territory of the United States. A strict construction of the theory could, of course, be made to justify a penalty, but even if the decision on this point were adverse to the American railroads, their appeal from "snap judgement" is well taken. The use of a Grand Trunk car from New York to Elmira, as in the hypothetical case cited, is apparently as serious a violation of International equity as the transaction which originated this controversy. For an American road and a Canadian road to systematically defraud the Treasury Department would obviously necessitate illegal collusion between the two roads. If there exists any jealousy in this country as to the possible existence of extensive practices of this kind it would naturally look towards a company like the Grand Trunk, having roads in both countries; but the Grand Trunk systems in the two countries are substantially separate in name and organization, and thus there should be as little difficulty in preventing wrong practices as though the roads on the two sides of the boundary were under separate ownership. No suspicion appears, however, to have been felt as regards the Grand Trunk; and so far as other Canadian companies are concerned, it would seem from the facts stated that the advantage would be wholly on the side of the United States. An American road has no temptation to buy cars in Canada, and Canadian roads must buy in the United States most of the cars that they cannot build in their own shops.

Atchison Earnings and Dividends.

The Atchison report contains an interesting defense of the course of the directors in increasing the dividends during the latter half of 1887.

"In forming a just opinion of this matter, it is necessary to recall to the stockholders the statement made in Circular of July 30, 1887, which announced the intention of paying 7 per cent., commencing with November of that year. It was stated in the Circular referred to that for the 'six months ending July 1, 1887, the net earnings exceeded by more than

\$1,200,000 the net earnings for the first six months of the year 1886,—that the earnings were still increasing, and what has always been true in the past may be expected this year also; namely, that the revenue of the second six months of the year will be considerably in excess of that of the first six months." The prospects of very good crops and a large fall business at the time the circular was issued was all that could be desired; and that the expectations were not unreasonable may be seen from the following figures, showing, first, the increase of gross earnings of the second half, compared with the first half of the following years:

	First Half.	Second Half.	Increase.
1884.	\$7,616,815	\$8,045,067	\$398,251
1885.	7,227,236	8,344,138	1,116,882
1886.	6,911,367	9,042,939	2,101,591
1887.	9,091,634	9,369,731	278,096
1888.	7,174,571	8,438,341	1,263,770

and, second, the increase of net earnings for the second half of each year as compared with the first half:

	First half.	Second half.	Increase.
1884.	\$3,535,940	\$4,201,343	\$665,403
1885.	3,114,928	4,000,693	1,485,764
1886.	2,912,767	4,920,583	1,977,816
1887.	4,199,965	4,404,109	204,144
1888.	1,999,763	3,225,334	1,225,571

It will thus be seen that, through the partial failure of the corn crop, and through other causes which did not exist and which were not apparent at the time the circular was issued, the year 1887 formed a remarkable exception to what had hitherto been the regular course of the Atchison Company's earnings, the second half of that year showing an increase over the first half of only \$278,096.30 gross and \$204,144.47 net. Had there been no failure of the corn crop in 1887—and all the indications pointed strongly in the other direction when the circular was issued—and had rates been maintained, the company would have earned more than the full seven per cent. for the entire year."

And again, in justifying the policy of extensions, the report says:

"Drouths, failure of crops, excessive competition, continually decreasing rates, unwise legislation, strikes and other calamities have befallen us, as they have other Western roads. But your directors could not know in advance that any of these unfavorable conditions would have to be met—much less that they would all have to be met at one and the same time."

Perhaps these things could not have been foreseen at the time when the extensions were built; but at the time when the rate of dividend was increased they had for the most part become clearly apparent. The duplication of railroads had reached its height. Excessive competition was an accomplished fact. The pooling clause of the Interstate Commerce law was in operation to prevent the roads from devising any easy means of bringing it under control. The temper of western legislatures was already clearly apparent. Strikes were as much of a danger then as they have been since. The public was able to see these things; much more so should have been the directors, who are elected to their position because they are supposed to be specially well able to understand the events which should affect the policy of their railroad.

The one independent fact which they could not fairly have been expected to foresee was the failure of the corn crop. Was the reduction of earnings largely due to this cause? The half-year figures which are given seem at first sight to indicate that it was. Where would such a reduction have made itself felt? Primarily, at least, on east-bound freight. But east-bound shipments in 1887 were larger than during any other year in the history of the company; and those for 1888 are larger than they were in 1885 or 1886. The variations on east-bound tonnage are much less than would be expected; those on west-bound tonnage are enormous and, at first sight, unaccountable. The report before us does not give the comparisons for successive years, but they are worth looking up. We find the results to be as follows:

	Tons of freight moved.	
	East-bound. West-bound.	
1884.	1,429,166	1,296,205
1885.	1,284,123	1,317,933
1886.	1,199,082	1,739,282
1887.	1,464,945	2,374,633
1888.	1,399,954	1,582,877

Let us now compare the relative movement of east and west bound freight with the expenditures for construction on auxiliary roads.

	Excess of west-bound over east-bound tonnage.	Construction charges on new roads.
1884.	-129,111	\$842,856
1885.	+35,810	474,877
1886.	+340,200	7,650,943
1887.	+909,688	21,908,747
1888.	+182,923	4,610,329

From this comparison we see:

(1) That the important variations in tonnage are not due to east-bound business, but to west-bound.

(2) That in the years 1884 and 1885, when new construction was nearly at a standstill, west-bound business fell to the level of east-bound.

(3) That in 1886, 1887 and 1888, large construction charges were accompanied by an enormous increase of west-bound tonnage; that the difference was largest when construction charges were heaviest; and

* Omitting Chicago extension expenditures of all kinds, since these would have no effect on freight receipts of Atchison for the year.

that, in 1887, the excess of west-bound freight over east-bound was more than 60 per cent.

It is not certain that this temporary expansion of west-bound tonnage was due to charges for railroad construction. It may have been due to the boom in real estate; a thing which is often so closely interwoven with railroad extension that the effects of the two are hard to distinguish. But the facts just given create a presumption that some of the apparent prosperity of the last half of 1886 and the first half of 1887 was created by receipts on construction freight. If this is true to any appreciable extent, it makes the explanation of the increased dividend rate quite unsatisfactory.

This last, as we say, is only a presumption; but we have looked in vain through the body of the report for evidence to rebut it. We are sorry to say that the result of reading the report has been to strengthen the presumption rather than to weaken it. A number of causes which have produced the reduction are enumerated and analyzed; this one is studiously ignored. It must have been a factor in the result; its omission from the statement looks as if it had been a more important factor than the directors like to acknowledge. Much stress is laid on the failure of the corn crop. This was unquestionably a serious misfortune, both direct and indirect. But we must again call attention to the fact that the chief variations of tonnage are not on east-bound shipments, but on west-bound. The volume of east-bound tonnage is fairly constant. On the other hand, the mere difference in west-bound tonnage between 1887 and 1888 is more than twice as much as the whole amount of corn ever carried by the Atchison in any of its most prosperous years.

Making all possible allowance for the heavy westward transportation due to the real-estate boom two years ago, it is hard to conceive how the change should have been so sudden, and the reaction so complete, as in the figures before us. We should like further information in the premises.

There is another set of facts bearing on the same question. The Atchison does not publish train-mile statistics, but it publishes carefully itemized engine-mile statistics which amount to nearly the same thing. We call special attention to the following figures:

	1887.	1888.
Tonnage in the direction of heaviest movement.....	2,374,633	1,582,877
Mileage of freight engines.....	7,106,839	7,728,083

We do not wish to use these figures for more than they are worth. A number of outside causes may come in to affect them. The increase in miles operated has much to do with the change. The freight engine mileage per mile operated has slightly diminished. But, after making all deductions, it still remains a startling fact that a diminution of fully one-third in the tonnage in the direction of heaviest traffic should have been accompanied by an increase instead of a reduction of freight-engine mileage.

The figures of operating expense emphasize this discrepancy. While ton-mileage has fallen from 900,600,000 in 1887 to 811,000,000 in 1888, and passenger mileage apparently* in about the same proportion, operating expenses have increased instead of diminishing. Nor is this all. The increase is most marked on those items which should be affected by changes in the volume of traffic. While the total expenses have increased but 5.38 per cent., train and car service has increased 12 per cent., locomotive service about 14 per cent, and locomotive supplies not quite 10 per cent. Equipment expenses show a large apparent increase but it may be fairly offset by a decrease in car mileage. As for maintenance of way, taking one item with another, we have a considerable net decrease, in spite of the increased track mileage. Here again we must warn our readers against the danger of using these figures for more than they are worth. Other roads besides the Atchison show much greater train-mile expenses in 1888 than in 1887. But the special circumstances in this case seem to indicate that the west-bound business of 1887 was of a kind to give the company much less trouble in handling than did that of 1888; and that no inconsiderable proportion of it was "company's freight."

In the face of these presumptions, even though they may fall short of absolute proof, the company's half-yearly figures are of little value. To make them worth anything, the directors must show how much or how little of the earnings in the last half of 1886 and first half of 1887 were due, directly and indirectly, to the construction of auxiliary lines which was going on at the time. If they can show that the amount of such construction freight was relatively small, it will indicate that their explanation was right and ours

* The actual figures of passenger mileage given in the report are obviously erroneous.

wrong. But we have only such figures as the directors have chosen to give; and these figures suggest very different inferences from those of the report before us.

Brakes and Brake Rigging.

An air-brake accident happened lately on the Duluth & Iron Range road. A train of 15 ore cars going down a long grade got beyond control, ran about four miles and then left the track. An officer of the road says that the air brake had been newly put on and it is supposed that the pistons did not travel past the leakage groove in the air cylinders and that consequently the air leaked out enough to release the brakes. An expert on the ground says, "the train had been handled very nicely and all the stops that were made, were made in good shape until the long hill was reached, and in fact all had gone so nicely that every one had all confidence in the ability of the engineer to continue to handle the train as he had been doing. It appears that the crew did not take the precaution to fully examine the brakes before starting down the hill and see that everything was all right and did not even remain out on the train, as the front brakeman was in the engine and the others in the caboose at the time the train was gaining headway. The engineer says that some of the brakes released after running a short distance, but how many he did not know; and after being applied again, some of them released again; and then, instead of calling for brakes and stopping with the hand brakes and learning the cause, he continued to set and re-set the brakes until he must have exhausted the air in the auxiliary reservoirs, and the train got beyond his control. It appears that some of the cars were supplied with new shoes before starting out, and the shoes in which there were rough places did not permit the pistons to travel quite far enough to cover all of the leakage grooves, and in those that did hold the shoes had not become shaped to the wheel and would not therefore hold as well as after a little wear." The lesson of this accident was promptly learned on that road, and the engineers have no further trouble and appear to have confidence in the new brake. It was fortunate that there was some one at hand to analyze the causes of the accident and make the lesson plain.

Air-brake accidents are almost invariably found when investigated to result like this one, either from defects of foundation rigging or from failure to take simple and ordinary precautions. There is much reason for dissatisfaction with the brake gear in ordinary use, especially, of course, on freight cars, but much too often in passenger service. A loaded freight car has none too much braking power at best, but an increase of the power, unless it be made dependent upon the weight of the car, would result in too great braking effect when the cars are unloaded, and so result in slid wheels. The braking power that is available for loaded freight cars must be carefully guarded and all conditions which reduce its amount must be avoided. It will not do to permit the brake devices to run for long periods without inspection or to permit careless adjustment by inexperienced men. In the case here considered it appears that the roughness and bad fit of the brake shoes caused a serious accident; but this is only one of the many that are constantly coming to light where the cause of the accident was at first laid at the door of "failure of the air brake." The failure of the air brake turns out to be a failure of a detail which if defective would have caused difficulty if the train had been fitted with hand brakes only. An imperfect bearing of a brake shoe on a wheel materially reduces the braking effect.

The carelessness sometimes seen in such matters as this is well shown by the decision of a railroad company not long since that stiff metal brake beams caused the wheels to skid. An investigation showed that the leverage was so great that when the air brakes were applied the wooden beams would spring enough to allow the pistons to bottom in the air cylinder, and thus limit the pressure on the wheels. When the stiff metal beams were put on the deflection was so little as to permit the full application of the braking pressure. The proper remedy was a reduction of the leverage, not a condemnation of the stiff brake beam.

Few persons understand how small is the liability of failure of the automatic air brake without the engineer, and those in charge of the train being well aware of the existence of the conditions which bring about the failure. The air brake itself is so far ahead of the details of the foundation rigging, with which it is used, that it is safe to conclude that the cause of a reported failure lies outside of the essential parts of the automatic brake until it is proved to the contrary.

In this issue our readers will notice an improved arrangement of brake beams and levers adopted by the Pennsylvania Railroad for passenger cars. This example shows how the necessity for a perfection of brake gear is appreciated. The limited number of passenger cars and the small difference between the loaded and empty car weights renders possible a more satisfactory arrangement of brake beams and levers as to both economy and efficiency, but in freight service the conditions are the opposite. The vast number of freight cars and the wide difference (66 per cent.) between the loaded and empty weights give rise to a set of conditions very hard to deal with. With present arrangement of levers and fulcrums which render the braking power independent of the weight of the car, we can use but about 90 per cent. of the empty weight of a freight car for the braked weight. This 90 per cent. is but 27 per cent. of the total loaded car weight, and, therefore, in a loaded freight train, we actually have but 27 per cent. of the weight available to retard and control the train. In passenger service more favorable conditions exist. Ninety per cent. of the empty weight is quite 80 per cent. of the loaded weight, a percentage quite sufficient to enable a train to be controlled on grades and to permit a very satisfactory emergency stop.

There seems to be only one remedy for the very small amount of brake-power available on freight trains at the present time, and that lies in the direction of a brake beam pressure graduated in amount with reference to the total weight of the car. It is desirable for many reasons to have the pressure graduated with reference to the velocity of the train as well, particularly for passenger service; but all would be quite contented for the present with a device which would graduate the braking effect with reference to the total weight of freight cars. Inventors of high standing have been working in the direction of a graduated braking power for some time. The Westinghouse Air Brake Co. has already brought out one device, and railroad men have suggested designs of more or less promise. If in the near future there is to appear a device which will permit the proportioning of braking effect on freight trains to the total weight of the train, or (and it is a most probable supposition) if a device is to be offered which will permit a rough approximation of the desired graduation, then the 15,000-lb. limit of pressure on brake beams, suggested by the Master Car-Builders' Association, is none too high. Ninety per cent. of a loaded 60,000-lb. car is about 80,000 lbs., and this divided among four beams allots 20,000 lbs. to each.

The adoption of a standard for future use in no way affects the present use of brake beams. Perishable beams can be made as weak as they now are without other loss to the railroad companies than that resulting from the use of an inferior device. There will be no wholesale scrapping of beams, because of their low ultimate strength, for some time to come. But when the beams purchased are of steel or iron, having a life of 30 or 40 years, and when the standard sought is for future use, then the requirements should be based upon the conditions which the beams will be liable to meet during their long life.

Annual Reports.

Atchison, Topeka & Santa Fe.—Miles operated 1888, 3,020; 1887, 2,622. Counting the auxiliary systems the total mileage more or less fully controlled is 7,706; the Atchison proportion, 7,118:

Capital stock.....	\$75,000,000
Funded debt.....	50,551,000
Deferred ".....	3,633,453
Current ".....	8,076,059
Surplus.....	11,067,456

Results of operations for the past two years have been as follows:

Gross earnings. Freight.....	\$10,194,043	\$12,248,343
Passenger.....	4,335,643	5,136,651
Total, incl. miscellaneous.....	15,612,913	18,461,366
Operating expenses, excl. taxes.....	10,387,815	9,857,291
Net earnings.....	5,225,098	8,604,075

Income account for 1888 is as follows:

Net earnings as above.....	\$5,225,098
Other railroad receipts.....	906,318

Interest, rentals and taxes..... 4,985,774

Rails and profit..... 1,162,643

Other receipts..... 711,129

From which are to be deducted:

Sundry contract charges..... \$772,660

Dividends..... 2,625,000

Net deficiency..... 1,517,887

Passengers carried east..... 1888. 1887. \$916,040 \$1,023,094

" " west..... 1,012,759 1,116,529

Tons carried east..... 1,390,934 1,464,915

" " west..... 1,582,877 2,374,633

Ton-miles..... 810,593,865 909,167,842

Rates per ton-mile, cents..... 1.258 1.347

" " passenger mile, cents..... 2.271 2.357

Various causes are assigned for the reduction—light crops,

duplication of railroads and resulting competition, adverse legislation both state and national, and general business depression along the line. The policy with regard to dividends and extensions is reviewed at length; we have discussed this part of the report elsewhere.

The Latest "Ocean Greyhound."

The recent performance of the Inman Line steamer, the "City of Paris," in breaking the record by making the westward trip in 5 days, 23 hours and 7 minutes, has excited general interest; and it may be well to record some particulars of the machinery. It will be remembered that the "City of New York" was designed for the especial purpose of making the trip within 6 days, but has not yet succeeded in accomplishing this feat. The manner of designing the lines of fast steamers is now so well understood, as well as the speed which can reasonably be expected by the development of a given power, that it was easy to calculate that a large steamer having the general proportions of modern transatlantic vessels, must exert from 18,000 to 20,000 indicated horse power, in order to reduce the time of passage to the desired limit. It was also well understood that in order to develop this power it was necessary to use steam of high pressure in engines working with great economy, and this pointed directly to the employment of triple expansion engines, which are now fast superseding the compound engines representing previous practice. The machinery of modern steamers is to some extent a compromise. It is necessary to limit the weight and space occupied as much as possible, and at the same time secure great efficiency. Large boiler capacity is usually obtained by burning the coal with forced draught; and since this mode of combustion materially reduces the economical performance of a boiler, it is essential to use the steam in very efficient engines, which result is accomplished, with the pressures now carried, by employing triple expansion engines.

The "City of Paris" is a good practical example of the preceding principle. The length of the vessel is 560 ft. over all; 530 ft. between perpendiculars; the beam is 63 ft.; the molded depth 43 ft., and the draught 25 ft. 9 in., the tonnage being 10,500. There are two propellers, of bronze, three-bladed, each having a diameter of 18 ft., and a mean pitch of 28½ ft. Each propeller is actuated by a triple-expansion engine, consisting of three cylinders, set fore and aft of the vessel, the stroke being 5 ft.; and the diameters of the several cylinders are: High-pressure cylinder, 48 in.; intermediate cylinder, 71 in.; low-pressure, 113 in.

The cylinders are fitted with piston-valves, actuated by the ordinary link motion. All the valves are of the same size, 30 in. in diameter. The high-pressure cylinder has one valve; the intermediate cylinder two, connected to one cross head and actuated by one link; and the low-pressure cylinder has four valves, two on each side, actuated by two links; the object of using multiple valves being to avoid excessive dimensions. The steam from the high-pressure cylinder is exhausted into a receiver, and from the intermediate cylinder it is exhausted into two receivers connected by pipes. All of the links are moved simultaneously by a reversing engine, but each link has an independent adjustment. The shells of the valve-chests and cylinders are jacketed, live steam connections being fitted to each jacket; but when running it is customary to pass the steam from the jacket of the high pressure cylinder successively into the jackets of the other two cylinders, admitting live steam when the pressure falls below a given point in any jacket. The jackets drain into reservoirs which discharge into the hot well. The cranks of the three engines are set at angles of 120° with each other. The piston rods are each 12 in. in diameter, the diameter of shaft and crank-pins is 22 in., the length of each crank-pin is 28 in., and the bearing surface on each guide is 9 sq. ft. The air pumps are actuated by links attached to the cross-head, and two Gwynne pumps, of the centrifugal type, are used for circulating-pumps.

Nearly all of the force required for actuating elevators, hoists, steering gear, etc., is obtained by hydraulic pressure, produced by two compound compressors maintaining the required pressure automatically.

The boiler plant consists of 9 fire-tube boilers, fired at each end, each boiler containing 6 furnaces, or 54 in. alt. The length of each boiler is 18 ft. 6 in., the diameter is 13 ft., and the shell, of steel, has a thickness of 1½ in.

The furnaces are of corrugated steel, ½ in. thick, and with a diameter of 4 ft. The grate surface of each furnace is 28 sq. ft.; total grate-surface, 1,512 sq. ft. There are three smoke-stacks, and 4 fire-rooms connected by passages having close-fitting doors. Each fire-room is arranged so that it can be closed air-tight, and there are twelve Tangye blowers which deliver the air for combustion under pressure into these fire-rooms. The average boiler-pressure is 150 lbs. per sq. in. above the atmosphere, and the average initial pressures obtained in the several cylinders of each triple-expansion engine are: high-pressure cylinder, 145 lbs. per sq. in.; intermediate cylinder, 60 lbs. per sq. in.; low-pressure cylinder, 7 to 10 lbs. per sq. in.

The average vacuum is 27 in. of mercury, and the speed of the engine is between 87 and 88 revolutions a minute. The boilers are fed by Worthington steam pumps, and the feed-water, before being admitted into the boiler, is forced through a heater supplied with live steam, where its temperature is raised to about 280 deg. Fahrenheit; this being done, not for purposes of economy, but in order to increase the durability of the boilers by preventing the unequal expansion and contraction which would be caused by the introduction of cold feed-water. For the same purpose an evaporator is

used, fresh water being obtained by evaporating sea water in a vacuum with live steam.

The engineering force required to supervise the operation of this machine deserves a passing notice. The engineers are in three watches. The chief engineer has general charge, and for each watch there is one second assistant engineer, who is supposed to visit the whole department; two third assistant engineers, one in the engine room and one in the fire-room; two fourth assistant engineers, attending to the fans and fire-room, and one fifth assistant engineer in the engine-room, making 19 engineers in all; and there is one water-tender on duty in each fire-room.

It has been calculated that it would be necessary to consume 400 tons of coal a day for the production of 20,000 horse-power; but according to the statements made by the officers of the "City of Paris," the average indicated horse-power developed on the recent trip was 20,700, and the coal consumption about 300 tons in 24 hours. Accepting these statements as correct, a simple calculation gives the following results: Pounds of coal per hour—Total, 28,000; per sq. ft. of grate-surface, 18.5; per indicated horse-power, 1.35; indicated horse-power per sq. ft. of grate-surface, 13.69.

These figures show the great efficiency of the triple-expansion engine. The "Etruria," one of the most successful steamers fitted with compound engines, has 72 furnaces, each with about the same grate surface as those of the "City of Paris;" but the indicated horse-power developed by the former vessel is only 14,000, or about half as much per square foot of grate surface as is obtained by the "City of Paris."

The distances run daily by the "City of Paris" in the recent trip, as published in the daily papers, are expressed in geographical miles or "knots," and it may be interesting to calculate the results in statute miles.

Date.	Knots.	Distance.	Statute miles.
May 3	445	513	
4	492	567	
5	504	581	
6	505	582	
7	511	589	
8	398	459	
Total	2,855	3,291	
Average speed per hour	19.95	23	
Average speed per hour	21.29	21.54	
On May 7			

The machinery of the "City of Paris" was constructed by Messrs. James & George Thompson, Clyde Bank, near Glasgow.

The Chesapeake & Ohio, in connection with the Pennsylvania, has put on a daily through train of vestibuled cars between New York City and Cincinnati. The train is called the "Fast Flying Virginian," and runs over the Virginia Midland Division of the Richmond & Danville between Charlottesville and Alexandria, Va. It passes through the mountain resorts of Virginia by daylight, and the time through is about 26 hours, the leaving time from New York being 3:30 p. m. and from Cincinnati 6:30 p. m. Direct connection is made at Cincinnati with a train over the Cincinnati, Indianapolis, St. Louis & Chicago to and from Chicago. The Pullman shops have built four complete trains for this run. The exterior appearance of the cars is similar to the modern Pullman sleeper save in the matter of painting. In this a radical departure was made, the bright orange-colored car body in vogue on the Chesapeake & Ohio and the "Kankakee" line being substituted for the dark Pullman colors. The gay red wheels and the silvered glass windows give a striking effect in combination with the paint. The interior is finished in mahogany, with rich plush furnishings. Five cars constitute a train; all the cars are steam heated (Sewall system) and equipped with air signals and electric lights. Where the patronage for this train is to come from does not clearly appear. The First Families of Virginia will no doubt ride in it, and they would probably do so even if it were not inscribed "F. F. V." but to attract through travel between New York or Philadelphia and the West in paying quantities will probably require a larger differential in the rate of fare than anything yet mentioned.

Most of the arguments that are brought forward against the use of steel ties are of the kind that can only be met by a good deal of costly experiment in the track. It is a comfort, therefore, to find one the precise value of which can be settled by five minutes' application of the multiplication table. A correspondent of the *Railway Age* suggested, in a recent communication to that paper, that the expansion and contraction of metal ties would make the gauge too wide in the summer and too tight in the winter. Had he used his lead pencil on the problem, he probably would not have raised an objection the trifling value of which every school boy understands. We may assume that steel varies 1-150,000 of its length for a change in temperature of one degree. If we take the extreme temperature to which the cross-tie in the track would be subjected at 120° F. in summer and -20° F. in winter, we have a range of 140°. If the track is set to gauge at a mean temperature of 50° F., the change in a length of 4 ft. 8½ in., due to a variation of 70° above or below the mean would be about ½ in. Nobody expects to lay or keep track to gauge within less error than this, and certainly it cannot be done with rails spiked to wooden ties.

Some New York City merchants are receiving letters from interior towns complaining of the advance in express charges for small parcels which, it will be remembered, went into effect on all the express lines on April 11, last. It is claimed that interior storekeepers, who have been in the habit of ordering small supplies by express, will now buy at home.

It may be doubted whether an advance of five or ten cents a package will cause this, and the companies may be assumed to have fully considered that point. Such a stoppage would curtail express revenues materially without adding much to freight earnings. Time alone can tell the effect of the new schedule, express people thinking that they can easily get the small advance from 25 cents to 30 cents, or 50 cents to 60 cents, without much loss of the parcels traffic.

As a curious instance of the complications arising from Canadian competition, and as showing how the good and bad results are intermingled, the following quotation from the annual report of the Northern Pacific for the year ending June 30, 1888, is interesting: "The Canadian Pacific, which has lately acquired a large, if not controlling, interest in the Minneapolis, St. Paul & Sault Ste. Marie system, is proving a very satisfactory eastern connection at Minneapolis, delivering us at that point, it is thought, more freight than is lost through its competition in the Pacific Northwest."

The New York Senate has passed a bill requiring freight cars to be fitted with automatic couplers. The debate on the question was amusing. One learned Senator said that 3,000 styles of coupler were presented to the Commission recently, and another told his colleagues that "with the old style of coupler there is a slack; the locomotive moves only the first car and the impulse is communicated from one to another until a great train of eighty cars is started. With automatic couplers a train could not be moved at all." Nevertheless the bill passed that body.

NEW PUBLICATIONS.

Hot Water Heating and Fitting; or, Warming Buildings by Hot Water. By William J. Baldwin. New York: The Engineering and Building Record, 1889. 8 vo., pp. 332. Price, \$4.

This is a book written by an author who seems to understand his subject thoroughly and knows how to impart his knowledge in a clear and intelligible manner, a combination which is comparatively rare, but which always produces happy results. The work is designed for practical men who are unfamiliar with abstruse calculations and methods, and nothing more than a fair knowledge of arithmetic is required by a reader who wishes to make an application of the rules. The book strikes a comparatively new field, and will doubtless be welcomed by practical men, for there is no other standard treatise on this subject except the works of Tredgold and Hood, which are now somewhat out of date. While the present work contains no startling novelties, it gives a well-arranged digest of the principles and practice which should be observed in heating by hot water. Perhaps the most valuable feature of the treatise is the description of a number of successful plants, given in such detail, both as to arrangement and dimensions, that they form valuable guides for future work. The author, in choosing his data, is wisely satisfied with practical approximations, and does not go into minute refinements which would really obscure the subject for practical men.

It is difficult, in a limited space, to give a satisfactory synopsis of a work so free from "padding" as the book under consideration; but some of the prominent features may well be noticed briefly.

The reason of hot-water circulation is clearly explained, and the principle of calculating the rate of circulation for different temperatures of the water is illustrated by diagrams, tables and examples. The necessary modifications, caused by friction in pipes, loss by contraction of the fluid vein, resistance of valves, bends and coils, are discussed, many numerical examples being given. The proper form for nozzles to prevent the contraction of the fluid vein is fully treated; and the losses of head due to bends and elbows are considered; it being shown that these losses, assumed to be 100 for a common elbow, can be reduced successively to 50, 14.8 and 7.8, by enlarging the admission and discharge orifices of the elbow and increasing its radius of curvature. The resistance of the radiators themselves is also considered, and it is shown that the resistance of radiators with bases is about the same as that of the same length of pipe; the resistance of coils with return-bends is considerably more, while that of wall-coils, connected with manifolds, is about the same as obtains with the radiators first mentioned.

In proportioning radiators for any given case, the author calculates the surface of the glass in the room to be heated, and assumes that from 7 to 12 sq. ft. of wall-surface are equivalent to 1 sq. ft. of glass; and that about ½ sq. ft. of radiating surface should be allowed for each square foot of glass, or its equivalent. The relative merits of heating by direct and indirect radiation are considered, and some experiments are quoted, showing the superior radiation obtained from indirect heaters, on account of the more rapid circulation of air. The principle of designing a hot-water plant is shown to consist in proportioning the pipes and radiators, so that the circulating water shall lose a certain amount of heat in passing through the radiators, this loss depending upon the velocity of the water; and diagrams are presented, giving the proportions of pipes and radiators, for losses of 10 and 17 deg., respectively. This practice is contrasted with the old method of using the same size of pipes throughout a building, and resorting to various devices in order to secure uniform circulation in the system; the economy and efficiency resulting from varying the proportions on the different stories being well illustrated. Single and compound circuits are discussed and illustrated by practical examples.

Considerable space is devoted to a description of hot-water boilers. The author's personal preference is for the cylindrical tubular boiler, and he details its proportions and de-

scribes the mode of setting; but he also illustrates and describes the principal styles of patented hot-water boilers.

The special details and fittings, such as radiators of various forms, air-taps, expansion tanks, valves and other fittings, are illustrated and described. The manner of testing radiators is fully explained, and there are some useful hints in regard to connecting thermometers, so as to obtain accurate temperatures.

The foregoing brief enumeration will give some idea of the variety and scope of this important work. In dealing with a subject of this character, many controverted points must be considered, and the author's treatment of such matters is admirable. He does not pretend to give absolutely correct data in such cases, but rather attempts to establish safe values, quoting his authority in every instance. As the writer is limited in his proportions by the ordinary sizes of pipe in the market, Mr. Baldwin considers that sufficient accuracy on the safe side will result from using the next larger regular size of pipe to the calculated size in any case, with the proviso that it is not desirable to employ supply and return pipes of less than $\frac{3}{4}$ in., and vent pipes of less than $\frac{1}{2}$ in., under any circumstances.

The author is to be congratulated on having furnished a very useful contribution to technical literature.

A General Formula for the Uniform Flow of Water in Rivers and Other Channels. By F. Ganguillet and W. R. Kutter, Engineers in Berne, Switzerland. Translated from the German, with numerous additions, including Tables, Diagrams and the elements of over 1,200 gaugings of Rivers, Small Channels and Pipes, in English measure. By Rudolph Hering, M. Am. Soc. C. E.; M. Inst. C. E., and John C. Trautwine, Jr., Assoc. Am. Soc. C. E., Assoc. Inst. C. E. John Wiley & Sons, 1889. 8vo., pp. 240.

This formidable title gives a very fair idea of the contents of the valuable book which is appended to it. It is, however, more than a mere explanation of a formula; it is an exceedingly interesting and valuable exposition of the methods of development of a mathematical expression for the action of natural laws, so as to enable the result of such action to be foretold under varying conditions.

The determination of the law governing the flow of water in channels has been a stumbling block to scientific men for centuries. Galileo, our authors tell us, is said to have been the first investigator of the scientific principles of the flow of water in rivers, and he declared that he had "found less difficulty in the discovery of the motions of the planets, in spite of their amazing distances, than in his investigations of the flow of water in rivers, which took place before his very eyes." The fact appears to have been that he misconceived the fundamental principles, and worked on wrong theories. Other investigators, Castelli, Torricelli, Guglielmi, Pitot, Bernoulli, followed during the 150 years succeeding Galileo's efforts, at the solution of the problem of flow, but their reasonings were abstract and not based on analytical observation of facts, and none of them even approximated to the truth. But about 1775 Brahms, a German, and Chezy, a French engineer, hit upon a form of expression which has been accepted ever since, as embodying the true principle of the flow of water in channels whether closed or open. This is the well known formula $v = c \sqrt{RS}$, in which R represents the ratio of the area of the flowing stream to the length of the border confining it, and S represents the slope of the surface of the stream in the direction of its flow, while c is a variable co-efficient dependent on the character of the surface over which the water flows. It must be noted, however, that the fact that this coefficient c is a variable and not a fixed quantity was not at first appreciated, and it took a great many observers and a number of years to establish the fact. But the fact being demonstrated beyond question, the efforts of investigators for several years have been devoted to finding out what the law governing its variation is.

Prominent among these investigators were Darcy and Bazin in France about 1855 and Humphreys and Abbot in the United States about 1858. The request of these last-named gentlemen that their formula for finding the value of c should be tested by applying it to results obtained by gaugings of streams in Europe appears to have been the cause of the subject being taken in hand by Ganguillet (the "chief engineer" of something or other in Switzerland, but of what exactly the book does not inform us) and Kutter, who was engaged on some Alpine road projects. They became satisfied that none of the previously made suggestions as to the law of variation of the coefficient were correct, and they set to work to devise a formula which should give correct results under all conditions. The algebraic and analytical problems involved were treated by Ganguillet, and the graphical investigations and most of the computations of results of observations, by Kutter. The mathematical reasoning by which the proper form of the expression was reached is very fully given. It will be read by very few. The final form in which the formula for velocity appears is somewhat appalling:

$$v = \left(\frac{a + \frac{l}{n} + \frac{m}{S}}{1 + (a + \frac{m}{n}) \frac{n}{\sqrt{R}}} \right) \sqrt{RS}$$

But it is not quite as bad as it looks, for a , l and m are constants and n is the only variable, its value depending on the roughness of the channel of the stream.

It is possible to construct a diagram which will give at a glance the value of c for any values of R , S and n , and such a diagram is given on Plate VIII. But to use this diagram for any special case, one must know what value to assume for n , and for this Messrs. Hering and Trautwine have compiled the hydraulic elements of over 1,200 gaugings in some 300 different channels and pipes under varying conditions of mean hydraulic depth, slope and roughness with a quite full

description of the character of the channel in each case. These have been collected from numerous sources comprising nearly all the published records of experiments on the flow of water in channels on which sufficient data were given for computing the value of the variable co-efficient. Nothing like this for practical use has ever been published, and it is invaluable for any engineer who is engaged in hydraulic work.

Various other interesting and valuable matters have been collected in this volume, the only fault with which, that we have to find, is that the names of Hering and Trautwine do not appear on the cover, instead of Ganguillet and Kutter, for the real value of the book to English-speaking engineers lies in the portion of it contributed by the American editors and compilers.

The Manual of American Water-Works. M. N. Baker, Ph. B., Editor. New York: Engineering News. 1889.

This is a well-bound, well-printed and business-like looking volume of over 600 pages, consisting mainly of a list of the water-works completed, constructing or projected in the United States. The states are arranged geographically, and the towns of each state are given alphabetically. Some little information concerning the population, geography and topography of each town is given, followed by a very concise statement of the character of its water supply and water-works. In an introduction of some 90 pages are given more extended information and statistical tables. The book is completed by an alphabetical directory of water-works officials, engineers and contractors.

Engineering (London) makes its issue of May 3 a special exhibition number of 104 pages, with a colored supplement. The history and organization of the Paris exhibition are given briefly, and the buildings, including the Eiffel tower, are shown and described in great detail. The illustrations are of the careful character to which readers of *Engineering* are accustomed, and the whole issue is a very remarkable achievement.

TRADE CATALOGUES.

Illustrated Catalogue of Fairbanks, Morse & Co., Chicago.—This firm has just issued a new catalogue showing some of the various special appliances for railroad use in which it deals. The articles illustrated are tanks, with various tank fixtures, wind mills and pumps, as well as steam pumps, the Sheffield and the Dodge stand pipe, the Sheffield cars, and various track tools, such as jacks, track drills and wrecking frogs.

TECHNICAL.

Electric Power Transmission.

The success attending the several electric power transmission systems put down by the Oerlikon Works, Switzerland, has more recently had the effect of directing attention to means of utilizing the water power of the River Rhine near Rheinfelden. Three prominent Swiss establishments, Zschokke & Co., of Aarau; Escher, Wyss & Co., of Zürich, and the already mentioned Oerlikon Works, have taken up the matter, and have commenced the preliminary work in connection with laying out plans for a plant. It is estimated that the Rhine can furnish about 15,000 horse-power, and this is to be distributed among the several industrial centres located within a radius of about 15 miles. To utilize the water power, 20 turbines, each rated at 750 horse-power, are to be coupled directly to as many dynamos. Permission has already been sought for the erection of the primary station at Rheinfelden. The financial side of the undertaking having been disposed of satisfactorily, everything now depends upon the grant of this permission by the government.

Steam Towing on French Canals.

The Minister of Public Works of France has just authorized two contractors of Paris to undertake a system of canal towing by traction engines. The contractors are Mr. Chambau and Mr. Deniau. The experiment is to be tried on the Bourbourg Canal, on the River Aa, between Dunkerque and St. Omer. The engines employed will be traction engines specially designed for the purpose. Those which were used in the former experiments of this sort were heavy and steered badly, and consequently destroyed the towpath very rapidly. The engines used in the present experiment will be considerably lighter. It is expected that canal boats will be hauled at a speed of from $2\frac{1}{2}$ to 3 hours.

Economical Engines.

Recently, exhaustive tests have been made upon notable examples of the compound system of engines that have of late been installed in New England for manufacturing purposes, and Messrs. E. P. Allis & Co., the builders of the Reynolds Corliss engine, are to be congratulated upon the performance of their engine, as it marks an important era in the history of furnishing steam economically for manufacturing purposes. At the Namquit mill, Bristol, R. I., was recently started a 250 horse-power compound engine of this type, with a high-pressure cylinder of 18 in. diameter by 42-in. stroke, and a low-pressure cylinder of 32 in. diameter and 42-in. stroke working upon independent cranks, placed upon the shaft at right angles to each other. The working barrels of the steam cylinders were thoroughly steam jacketed, or enveloped by steam direct from the boilers, and also each of the two heads of the cylinders, while the receiver, or connection for conveying the exhaust steam from the 18-in. engine across to the 32-in. cylinder was likewise steam jacketed by steam at boiler pressure. This engine was guaranteed by the builders to the purchaser to deliver an indicated horse-power with a consumption of 15 lbs. of water evaporated into steam at boiler pressure per hour. The average indicated horse-power, determined from an average of the 120 cards taken during the day, was 233.7 horse-power, the consumption of water, including that required for steam jackets, was 13.26 lbs. per hour per indicated horse-power, or 11.6 per cent. less than the builders' stipulated guarantee of 15 lbs. Other equally satisfactory tests have been made with these engines in several New England mills that substantiate the claims made for them. But probably the most notable machine which this firm has contracted to furnish for New England manufacturers, and one from which they hope to achieve a still greater fame, is the one of 500 horse-power that is to be erected shortly for the

Narragansett Electric Lighting Co., of Providence, R. I., of the triple expansion type. It is to run 100 revolutions per minute, with 180 lbs. steam pressure, is guaranteed to develop an indicated horse-power for each 12.5 lbs. of water per hour, and is to run in connection with a large surface condenser, probably the largest in New England.—*Eng. & Min. Journal.*

An Automatic Time Signal.

The Fontaine Crossing & Signal Co., of Toledo, O., has brought out an automatic signal for indicating the time that has elapsed since the passage of a train. This signal registers the time up to 20 minutes, and is put in operation by the passage of a locomotive wheel over a small track instrument.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Cleveland & Pittsburgh, regular quarterly, $1\frac{1}{4}$ per cent., payable June 1.

Delaware & Bound Brook, quarterly, 2 per cent., payable May 15.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Burlington, Cedar Rapids & Northern, annual meeting, Cedar Rapids, Iowa, May 28.

Canada Southern, annual meeting, June 5.

Chicago & Eastern Illinois, annual meeting, Chicago, Ill., June 5.

Chicago & Northwestern, annual meeting, Chicago, Ill., June 6.

Chicago, St. Paul, Minneapolis & Omaha, annual meeting, Hudson, Wis., June 8.

Galveston & Western, annual meeting, Galveston, Tex., June 1.

Hancock & Pennsylvania, special meeting, 16 Exchange Place, New York, May 18.

Louisville, Evansville & St. Louis, special meeting, Mr. Vernon, Ill., May 20.

Middletown, Unionville & Water Gap, annual meeting, 15 Cortland street, New York, May 27.

New York & Harlem, annual meeting, Grand Central Depot, New York, May 21.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Railway Master Mechanics' Association* will hold its next annual convention at Niagara Falls, beginning Tuesday, June 18, with headquarters at the International Hotel. All who wish to secure rooms should apply to Mr. A. H. Gluck, Manager, International Hotel, Niagara Falls, N. Y.

The *Master Car-Builders' Association* will hold its next annual convention at Saratoga Springs, N. Y., June 25. Hotel accommodations may be secured by applying to H. S. Clement, Manager Congress Hall.

The *Train Dispatchers' Association* will hold its second annual convention in Indianapolis, Ind., June 12. E. J. Peabody, 237 Franklin street, Chicago, is Secretary.

The *Association of American Railways Accounting Officers* will hold its next meeting at Niagara Falls, N. Y., July 10.

The *International Association of Car Accountants* will hold its fourteenth annual meeting at Plank's Grand Hotel, Island of Mackinaw, Mich., June 25.

The *Traveling Passenger Agents' Association* will hold its next meeting at Denver, Colo., Sept. 10.

The *New England Roadmasters' Association* will hold its next meeting in Boston, August 21.

The *American Association of General Passenger and Ticket Agents* will hold its next semi-annual meeting in Atlanta, Ga., Sept. 17.

The *National Association of General Baggage Agents* will hold its next meeting at Detroit, Mich., July 17.

The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month, except June, July and August. The next meeting will be held Sept. 11.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month. The club will give a banquet at Delmonico's, May 23.

The *Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m. on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

American Society of Civil Engineers' Annual Convention of 1889.

The convention will be held at Seabright, N. J., beginning on or about June 20, 1889. Seabright is on the Atlantic Coast, a few miles north of Long Branch, and within about an hour's time from New York by boat or by rail. Arrangements as to transportation are in progress with the

Passenger Associations and Committees, whereby it is expected that a rate of one and one-third full fare will be made for the round trip from all points on the lines of the roads represented by such association.

Members are invited to contribute papers or discussions on papers already published. A concise abstract of any paper to be presented should be sent to the Secretary not later than May 31. This will make discussion more probable, as a copy of the abstract will be sent to members who may be expected to contribute discussion.

Engineers' Club of Kansas City.

A regular meeting was held May 6, Vice-President Breit-haupt in the chair, 7 members and 2 visitors present. Mr. Robert A. Crawford was elected an associate member.

Mr. Sonne presented a final report of the committee on transfer of members. It is the opinion of the committee that it is desirable that some arrangement be made for transfer of membership between local societies, and on the recommendation of the committee the matter was put in the hands of the Board of Managers of the Association to arrange a working plan.

On recommendation of the Executive Committee, a standing committee on Cements and Mortars was appointed, consisting of Messrs. D. Bontecou, W. D. Jenkins and E. Saxon. Messrs. Sonne, Gunn and Mason were appointed a committee to arrange for the annual summer excursion.

Mr. Sonne read a paper on the foundations of the Liim-jord Bridge. This bridge was built near Aalborg for the Danish state railroads. One pier was sunk to a depth of 58 ft. and six others to depths of from 111 to 114 below mean water. They were sunk by the pneumatic process, through soft and tenacious mud. They were built with iron caissons, the masonry being hard-burned brick laid in Portland cement. They were lowered from scaffolds and kept suspended during the sinking; each by four rods or chains hooked around the cutting edge. One of the piers was overturned and rested on the centre line of the bridge. A new pier was lowered and had to be carried through the old one. The work was done by a French firm.

At the meeting of May 20 a paper will be read on Inspection of Iron Bridges, by Henry Goldmark; June 3, a paper on Proposed Sewerage for Oak Creek District, by W. Kiersted and A. J. Mason.

New England Water-Works Association.

The 8th annual convention will be held at Fall River, Mass., June 12, 13 and 14. The programme includes topical discussions and the following addresses and papers: "Hydrants," by George A. Stacy, Supt., Marlboro, Mass.; Prof. J. E. Denton, of the Stevens Institute of Technology, Hoboken, N. J., will address the association on "The best economy attained by the modern High Expansion Type of Pumping Engine compared with the best record of Cornish Pumping Engines during the time of Watt as recorded by the Wicksted Experiments," illustrated by lantern views; "Water-Works at Richmond, Va., by Charles E. Bolling, Supt., Richmond, Va.; "Friction in the collection of meter rates," by George F. Chase, Supt., Taunton, Mass.; "Water-works Records," by Albert S. Glover, Registrar, West Newton, Mass.; "Recent Progress in the Biological Analysis of Water," by Prof. W. T. Sedgwick, Mass. Inst. of Technology, Boston, Mass.

The Western Railway Club.

The club will hold its next meeting May 21, at 2 P. M., in the Phenix Building, Jackson street, Chicago. The subject for discussion is "The Rules of Interchange."

The committee appointed at the last meeting will report upon revision of these rules, and a full attendance is especially desired, that these proposed changes may be thoroughly discussed. The Arbitration Committee of the M. C. B. Association has especially requested that the Railroad Clubs shall suggest desired changes in the rules.

PERSONAL.

—Mr. Lyman K. Bass, General Counsel of the Denver & Rio Grande Western and the Mexican National Railroad Companies, died in New York, April 13.

—Mr. Edward Hoyt, Purchasing Agent of the Oregon Railway & Navigation Co., has resigned that position on account of ill health and has gone to Cincinnati, Ohio.

—The legislature of New York has passed a law empowering New York City to appropriate \$10,000 for a monument in any park or public square in memory of the late John Ericsson.

—Mr. W. C. Wetherill, formerly Chief Engineer of the Mexican National, and lately of King & Wetherill, contractors, has taken the position of General Manager of the Empire Zinc Co., Joplin, Mo.

—Mr. William J. Trace, of the *National Car-Builder*, died suddenly on the morning of May 15. Mr. Trace was a young man of estimable and lovable qualities. He had a wide acquaintance and many friends among railroad men.

—The President has appointed John F. Plummer, of New York City; George E. Leighton, of St. Louis, Mo.; Jesse Spalding, of Chicago, Ill.; and Rufus B. Bullock, of Atlanta, Ga., to be Government Directors of the Union Pacific Railroad Co.

—Maj. W. A. Hawkins, who has charge of locations on the Tennessee Midland from Memphis to Nashville, has been appointed Consulting Engineer for the Danville Construction Co., which is constructing the Atlantic & Danville. His headquarters will be at Danville, Va.

—General E. M. Biddle, Secretary and Treasurer of the Cumberland Valley road, died in Carlisle, Pa., May 13. He was born in Philadelphia 1808, and was graduated at Princeton College in 1827. He was probably the oldest railroad official in the United States, and he had served 50 years with this road as Secretary.

—J. M. Bechtel, Division Freight and Passenger Agent of the Chicago, Burlington & Quincy, at Burlington, Ia., was recently arrested on a complaint of failure to comply with the law requiring posting of rates in freight and passenger stations. Mr. Bechtel gave bonds for his appearance at the next term of court in Clarinda.

—Mr. J. T. R. McKay, Chairman of the Freight Committee of the Central Traffic Association, is now making an extended tour of Europe because of illness. He has resigned his position as Chairman of the Committee, and his successor will soon be chosen. Mr. McKay is General Freight Agent of the Lake Shore & Michigan Southern.

—Mr. R. H. Lewis, President of the Chicago Furnace Co., and Vice-President and General Manager of the Calumet Iron & Steel Co., of Chicago, recently resigned both of those positions. He remains Vice-President of both the Chicago Drop Forge & Foundry Co. and the Milwaukee Furnace Co., and President of the National Coke & Fuel Co.

—Col. D. S. Walton, City Engineer of Portsmouth, Va., fell dead in that city May 9. During the war Col. Walton was in the engineer corps of the Confederate army, and after the

war was engaged in New Orleans and on the Isthmus of Panama for the Government. For a number of years he was engaged on the Erie Canal and important water lines in Canada. He was about 70 years old.

—Mr. Donald Macdonald who has just been appointed Assistant General Manager of the Chesapeake & Ohio at Cincinnati, is one of the youngest men in that position in the country, being now in his twenty fifth year. During the services of Mr. J. T. Harahan as General Manager of the Louisville & Nashville, Mr. Macdonald was his chief clerk, and by that gentleman is said to be one of the most promising young railroad men in the country.

—Mr. A. B. Starr, Superintendent of the Pittsburgh, Fort Wayne & Chicago, who has been on trial at Pittsburgh on charge of criminal negligence in issuing an order permitting locomotives to run over grade crossings protected by gates without giving a signal of any kind, either whistle or bell, has been acquitted, though the jury decides that he must pay the costs of the suit. Two passengers in a street car were killed by a locomotive at a crossing in Allegheny City.

—Mr. Elceutus B. Litchfield died of pneumonia May 12 in Brooklyn, N. Y. He was born in Delhi, N. Y., in 1815. In 1845 he came to New York, and has since been connected with railroads. He was interested in building the Michigan Southern, the Northern Indiana, and portions of the Lake Shore, and the Cleveland & Toledo roads. In Brooklyn he constructed several street railroads. A few years ago he bought the Brooklyn, Bath & West End, and was for some time its President.

—General Adna Anderson committed suicide in a hotel in Philadelphia, on the night of May 14. It is supposed that he must have been temporarily insane. General Anderson was born at Ridgeway, N. Y., July 25, 1827. His life was spent in railroad work in various capacities, in the engineering and operating departments. During the war he was Chief Engineer and Superintendent of military railroads, and in 1864 all the military railroads in the United States were put under his command. It was in this service that he got his military rank. In February, 1880, he became Chief Engineer of the Northern Pacific, and in 1886 he became Second Vice-President also. In 1887 he resigned and has since been engaged in various private enterprises mostly in New York city. He was a man of great force and rectitude of character, and of high professional standing.

ELECTIONS AND APPOINTMENTS.

Anniston & Montgomery.—At a meeting of the stockholders of the Anniston & Montgomery, held May 9, the following officers were elected: John W. Noble, President; William Noble, Vice-President; John B. Rees, Secretary and Treasurer; E. E. G. Roberts, Chief Engineer.

Atchison, Topeka & Santa Fe.—The annual meeting of the company, held at Topeka, Kan., May 9, passed off very harmoniously with a larger vote than ever before polled. The number of shares represented was 631,811. Thomas Baring divided 442,520, the rest being voted by W. B. Strong, B. P. Cheney, Alden Spear and C. K. Holliday. The following directors were elected: B. P. Cheney, W. B. Strong and Alden Spear, Boston; C. K. Holliday, Topeka; E. B. Purcell, Manhattan, Kan.; L. Severy, Emporia, Kan.; G. C. Magoun and Thos. Baring, New York; Oliver W. Peabody and Geo. G. Crocker, Boston; Edwin H. Abbott, Cambridge, Mass.; Wm. Libby and John J. McCook, New York. The retiring directors are J. T. Burr, C. R. Codman, George O. Shattock, A. W. Nickerson, Warren Sawyer and W. F. Wharton. The directors organized by the election the following officers: W. B. Strong, President, Boston; G. C. Magoun, Chairman of the Board, New York; C. W. Smith, First Vice-President, Boston; A. A. Robinson, Second Vice-President, Chief Engineer and Manager, Topeka; J. F. Goddard, Third Vice-President, Chicago; E. Wilder, Secretary and Treasurer, Topeka; G. L. Goodwin, Assistant Treasurer, Boston; C. S. Tuckerman, Assistant Secretary, Boston; Geo. R. Peck, General Solicitor, Topeka; J. J. McCook, General Counsel, New York; J. P. Whitehead, Comptroller, Boston; Jos. W. Reinhardt, General Auditor, Boston; H. C. Clements, Auditor, Topeka; A. A. Glaser, Transfer Agent, Boston. Subsequently the resignation of C. W. Smith, First Vice-President, was presented, to take effect June 1, and was accepted. At the request of Mr. Strong resolutions were passed transferring the President's office from Boston to Chicago. A number of changes in the by-laws were presented, and a plan to provide for the change in organization. The President's removal to the West, to give his entire attention to the management of the property, rendered desirable that the functions of the Chairman of the Board should be somewhat enlarged, upon the basis of the New York Central & Hudson River and other large roads.

Baltimore & Delaware Bay.—The annual meeting of the stockholders of the company was held in Chestertown, Md., May 1, and the following directors were elected to serve for the ensuing year: J. Rogers Maxwell, R. W. Forrest, E. Thelin, George C. Jones, S. M. Williams, F. L. Hall and J. W. Watson. F. L. Hall was elected President, George Jones Secretary and Treasurer and E. P. Stacey Superintendent. J. R. Franklin is General Agent and is located for the present at Chestertown.

Baltimore & Ohio.—The regular monthly meeting of the Baltimore & Ohio was held this week, and Mr. J. T. Odell, late of the Chesapeake & Ohio, was elected General Manager of lines east and west of the Ohio River. W. W. Peabody was appointed General Superintendent of lines west of the Ohio River, with the same duties and powers as he has heretofore exercised as General Manager. He was also appointed General Agent at Chicago.

Boston, Concord & Montreal.—At a recent meeting of the directors, H. N. Turner, of St. Johnsbury, Vt., formerly General Traffic Manager of the Boston & Maine road, was elected to fill a vacancy in the board.

Burlington & Missouri River.—H. S. Wiggins, Assistant Auditor, has been appointed Assistant Auditor of the Treasury Department, and has been succeeded in the first position by W. P. Durkee, who has been an Assistant Auditor.

Camden & Burlington County.—The annual meeting of the stockholders was held yesterday, and the following directors elected: John S. Irick, Richard C. Shreve, Richard Ashurst, W. H. Gatzner, Edmund Smith, J. N. DuBarry, C. S. Sims, J. C. Sims, Jr., W. Budd Deacon, William S. Taylor, W. J. Sewell, W. H. Wilson, Joseph H. Gaskill, W. N. Barnard, Charles E. Hendrickson. John S. Irick was afterwards elected President, Richard Ashurst Secretary, and Dr. Taylor Treasurer.

Canadian Pacific.—D. McNicoll, General Passenger Agent of the Canadian Pacific, Eastern Division, has been made General Passenger Agent of the entire system, and the office of Passenger Traffic Manager, recently vacated by Lucius Tuttle, has been abolished. C. E. E. Ussher has been appointed Assistant General Passenger Agent of all lines, office at Montreal. W. F. Egg

has been appointed District Passenger Agent, office at Montreal.

Central Pennsylvania.—The following are the directors of the new Pennsylvania Company: Samuel H. Hicks, of Watertown, Pa., President; James I. Higbee, Lorenzo Everett, Enoch Everett, Simpson Smith, Hiram Dunkle and Charles D. Berger, all of Watertown, Pa.

Central of New Jersey.—The stockholders of the company held their annual meeting last week and elected the following directors: Austin Corbin, Charles Lanier, Harris C. Fahnestock, J. Rogers Maxwell, James A. Garland, George F. Baker, Edward D. Adams, Henry Graves and Henry W. Maxwell.

Chesapeake & Ohio.—Donald Macdonald has been appointed Assistant General Manager, vice M. B. Cutter, resigned. The position of Chief Clerk to the General Manager has been abolished, and that of Assistant General Manager created.

H. R. Dill, Superintendent of the Huntington Division, has appointed F. W. Malcolm Engineer Maintenance of Way, with headquarters at Hinton, W. Va.

Charles R. Bishop has been appointed General Eastern Passager Agent, with headquarters in New York.

M. B. Cutter has been appointed Superintendent of the division between Richmond and Newport News and the terminal points at Newport News and Norfolk.

Chicago, Burlington & Quincy.—The annual meeting of the stockholders was held at its general offices in Chicago, Ill., May 15. The old Board of Directors was re-elected, except that Richard Olney, of Boston, was elected in place of Sydney Bartlett, deceased. The members of the Board are as follows: John W. Forbes, Charles J. Paine, John L. Gardner, William Endicott, Jr., Francis W. Hunnewell and Richard Olney, of Boston; T. Jefferson Coolidge, of Manchester, Mass.; J. N. A. Griswold and Peter Geddes, of New York; Wirt Dexter, of Chicago, and Charles E. Perkins, of Burlington, Ia. There were 430,000 shares of stock represented at the meeting.

Cleveland, Akron & Columbus.—A. W. Dunning, of New York, formerly Assistant Secretary of the Louisville & Nashville, has been elected Auditor, with office in Akron, Ohio, to succeed C. W. Schaap, resigned.

Cleveland & Canton.—The annual meeting of the Cleveland & Canton stockholders was held in Canton, Ohio, May 8, and the following board of directors elected: H. A. Blood, W. J. Reach, G. N. Smalley, W. O. Chapman, Albert Van Wagener and Will Rotch, of Boston; F. W. Hopkins, New York; Henry C. Ranney, Seth Paine, Edward S. Flint, A. S. Emory, and William Edwards, of Cleveland; Louis Schaefer, of Canton; M. Churchill, of Zanesville, and S. H. Taylor, of Carrollton. Of the above all are the old directors except F. W. Hopkins and M. Churchill.

Cleveland, Lorain & Wheeling.—The annual meeting of the stockholders was held last week. About 50,000 of the 56,000 shares were voted and the old board of directors and officers were re-elected as follows: Directors, Selah Chamberlain, Worthy S. Streator, E. R. Perkins, Oscar Townsend and C. L. Cutler, Cleveland; John Newell, Chicago, and H. A. Kent, New York. Officers, Selah Chamberlain, President; Worthy S. Streator, Vice-President; Oscar Townsend, General Manager and Acting General Freight and Passenger Agent; C. L. Cutler, Secretary and Treasurer; J. W. Tyler, Counsel; Frank M. Townsend, Superintendent; W. H. Park, Auditor; James Reynolds, Roadmaster; and G. F. Tennant, Paymaster.

Cleveland, St. Louis & Kansas City.—At the annual meeting of the stockholders of the road held in St. Louis, May 8, the following directors were elected: T. C. Clarke, F. C. Hollins, E. H. Emerson, and George W. Van Sisele, New York City; James Roosevelt, Irvington-on-Hudson; N. Y.; R. W. Webb, Madison, N. J.; P. K. Green, Jersey City, N. J., and J. T. K. Hayward; St. Louis, Mo.

Columbus.—The first annual meeting of the shareholders was held this week in Columbus, Ga. The old board of directors was re-elected, as follows: Directors, L. F. Garrard, J. J. Flournoy, Cliff B. Grimes, J. H. Henderson, F. D. Peabody, and Theo. M. Foley. The directors have not yet elected officers.

Cumberland & Big Gap.—Incorporated in Tennessee by James Geddes, Charles E. Currey, B. F. Champe, E. G. Connette and E. Baxter.

Dakota Railroad Commission.—The Dakota Railroad Commission has effected a permanent organization by the election of Jud La Moure as Chairman and J. L. Robinson, of Watertown, Secretary. The headquarters of the board have been located at Bismarck.

Delaware & Hudson Canal Co.—The annual meeting of the company was held this week. The following Board of Managers was elected to serve for the ensuing year: A. A. Low, Le Grand B. Cannon, James R. Taylor, John Jacob Astor, James Roosevelt, David Dow, Robert M. Olympian, Benjamin H. Bristow, John A. Stewart, Frederick Billings, R. Suydam Grant, W. M. Tillings and Johnston Livingston. The only new name on the board is that of Johnston Livingston, who takes the place of A. R. Van Nest, deceased.

Duluth, South Shore & Atlantic.—George T. Jarvis, Superintendent, having tendered his resignation, the duties heretofore performed by the Superintendent will be assumed by the General Manager, W. W. Fitch, with office in Marquette, Mich.

El Paso Rapid Transit.—The directors of this Colorado company are: F. L. Martin, J. W. Huff, M. A. Leddy, A. A. McGroarty, E. J. Eaton, A. L. Lawton and W. C. Bradbury.

Indianapolis & Vincennes.—At the annual meeting of the stockholders of the company, a division of the Pennsylvania system, held last week, G. B. Roberts, J. N. McCullough, William Thaw, Thomas D. Messler, W. H. Barnes, Samuel F. Gray and William Mullins were elected directors.

Kanawha & Ohio.—Grinnell Burt, President of the Lehigh & Hudson River Railroad, has been elected President of the Kanawha & Ohio.

Kansas City, Chattanooga & Port Royal.—J. F. Shipp has been elected President, Major J. C. Wall Vice-President, and J. Smith Secretary.

Long Island.—W. E. Bailey has been appointed Assistant Superintendent of the road, with office in Long Island City.

Louisville, Evansville & St. Louis.—At the annual meeting of stockholders of the company held in Mt. Carmel, Ill., May 8, the following directors were elected: C. C. Baldwin and James Silliman, of New York; D. J. Mackey, William Heiman, Samuel Bayard and J. E. Igglehart, of Evansville, Ind., Edward Cummings, of Covington, Ky., St. John Boyle, of Louisville, Ky., Robert Bell, of Mt. Carmel, Ill.; T. W. Scott, of Fairfield, Ill., and Bluford Wilson, of Springfield, Ill.

Ill. The directors elected D. J. Mackey, President; W. J. Lewis, Secretary and Treasurer; George F. Evans, General Manager; J. J. Collier, Auditor, and A. P. Humphreys, General Counsel. The office of the Secretary and Treasurer was changed from Boston to Evansville.

Louisville & Nashville.—W. Alfred Kellond has been appointed Assistant to the General Manager, vice Donald Macdonald, resigned.

Macon & Dublin.—The directors of the road and the stockholders met in Dublin, Ga., recently. The old directors and officers were re-elected.

Manitoba & Northwestern.—The annual meeting was held in Montreal, Can., May 3. Directors were elected as follows: Andrew Allan, President; F. H. Brydges, Vice-President; Montague Allan, A. T. Drummond, John Allan, R. G. Allan, A. A. Allan, Brice Allan.

Maryland Midland.—The incorporators of the company are: Charles A. Councilman, Jacob D. Geist, Garrett D. Waters and John Carroll, of Baltimore County, and Howard Munnikhuysen, of Baltimore city.

Mexican National.—S. H. Bass, General Eastern Agent, has been promoted to the position of General Freight & Passenger Agent, with headquarters in the City of Mexico, in place of W. Morcom.

Missouri, Kansas & Texas.—The annual meeting was held in Parsons, Kan., May 15. The following were elected directors for the ensuing year: Rudolph V. Martinson, Henry K. Enos, William Dowd, E. Ellery Anderson, William Bond, Simon Sterns, Jacob Denningville, Samuel Sloan, George U. Forrest, Herman B. Baltzer, Maynard C. Eyre, of New York; Harrison Cross, Emporia, Kan.; Benjamin P. McDonald, Fort Scott, Kan.; Lee Clark, Parsons, Kan.; James C. Thompson, Sedalia, Mo.; John Hancock, Austin, Tex.

Missouri Pacific.—W. H. Newman, Third Vice-President, has resigned his office and will sever his connection with the system on June 1. J. S. Leeds, Chairman of the Transcontinental Traffic Association, has resigned, and has accepted the position of Freight Traffic Manager of the Missouri Pacific. The office of Third Vice-President of the Missouri Pacific has been abolished.

Montana & Canada.—The stockholders of the company have elected the following directors: S. T. Hauser, Alex. T. Gault, W. G. Conrad, T. C. Power, Hervey Barbour, O. R. Allen, G. H. Hill. The directors elected the following officers: President, S. T. Hauser; Vice President, W. G. Conrad; Secretary, George H. Hill; Treasurer, O. R. Allen. The principal office will be in Helena, Mont.

Mt. Washington.—The company has elected these directors: Walter Aiken, C. E. Bartlett, James T. Furber, Frederick Smyth, Nathaniel White, Jr., John P. George, George A. Fernald. Walter Aiken was reelected President, Frank E. Brown, Clerk, and Edward D. Harlow, Treasurer.

Pennsylvania.—G. W. Creighton, Assistant Engineer of the West Jersey and Camden & Atlantic divisions of the Pennsylvania, has been transferred to the Philadelphia division, to succeed W. Heyward Meyers, transferred. L. C. Macomb, Supervisor of the Philadelphia division, has been made Assistant Engineer of the West Jersey division.

The following changes and appointments have been announced, to take effect May 13: W. B. McCaleb, to be Supervisor of Division No. 2 in Philadelphia; J. W. Nelson, Supervisor Division No. 4, vice W. B. McCaleb, transferred; T. J. Breerton, Supervisor Division No. 22, Tyrone Division, vice John Nelson, transferred.

The following railroad companies held their annual meetings May 11 and elected officers for the ensuing year:

Philadelphia & Lehigh Valley.—President, J. N. DuBarry; Directors, John P. Green, Wistar Morris, Samuel Red, G. B. Roberts, N. P. Shortridge, Henry D. Welsh.

Pennsylvania & Schuylkill Valley.—President, J. N. DuBarry; Directors, J. C. Bright, B. B. Coomegys, Henry Eppelheimer, John P. Green, H. H. Houston, Amos R. Little, Wistar Morris, N. P. Shortridge, Heber S. Thompson, Henry D. Welsh.

Pennsylvania Co.—D. C. Copperstone has been appointed Assistant Auditor of Disbursements of the Pennsylvania lines west of Pittsburgh, with headquarters at Pittsburgh. He succeeds Frank Thayer, who takes a position with the Pennsylvania Company's Employees' Relief Association, with headquarters at Cleveland, Ohio.

Philadelphia Belt Line.—The officers are: President, Francis B. Reeves; Secretary, John Norris; Treasurer, William Brocke, Philadelphia; W. M. Singerly, James Dobson, E. C. Knight, Wharton Barker, William Brocke, Walter F. Hagar, Charles H. Cramp, E. A. Hancock, Wm. H. Jenks, Calvin Pardee, directors, all of Philadelphia.

Philadelphia, Wilmington & Baltimore.—At the annual meeting of the Cambridge & Seaford Co., held at Cambridge, Md., May 6, George B. Roberts was elected President; Robert H. Groff, Secretary, and Robert W. Smith, Treasurer.

Pittsburgh, Ft. Wayne & Chicago.—At the annual meeting of the stock and bond holders of the road, in Pittsburgh, this week, L. H. Myers, E. P. Williams and Charles E. Spear, whose terms as directors had expired, were re-elected.

Port Jervis, Monticello & New York.—Benjamin Ryall has been appointed Manager of the road, and Eli McMillan, for many years a conductor, is now Superintendent, both with office in Port Jervis, N. Y.

Poughkeepsie Bridge Co.—John S. Wilson, President of the Poughkeepsie Bridge and the connecting railroad companies, has appointed S. B. Opdyke General Superintendent of all the lines, with headquarters at Hartford, Conn.; D. P. Martin Superintendent of the Connecticut division, and George C. Thayer, recently of the Pennsylvania, is Superintendent of the western division including the bridge proper. P. P. Dickinson is Chief Engineer and L. C. Patterson is Assistant; Newton R. Turner, formerly Division Freight Agent of the Philadelphia & Reading, is General Freight Agent, H. C. Watson is Auditor.

Ohio River.—At the annual meeting of the stockholders held on May 9, the following directors were elected for the ensuing year: James G. Fair, E. W. Clark, S. W. Colton, Jr., C. W. Harkness, W. P. Thompson, Chas. Pratt, J. P. Isley, J. N. Camden, G. W. Thompson, W. N. Chancellor, R. H. Browne, R. S. Brown, J. N. Camden, Jr. The board organized by the election of G. W. Thompson, President; Wm. N. Chancellor, Secretary; W. M. Trevor, Treasurer; and E. W. Warnick, Auditor.

Paris, Choctaw & Little Rock.—The annual meeting of the stockholders was held in Paris, Tex., May 11, and the following directors were elected: S. J. Wright, T. D. Craig, L. P. Harrison, D. H. Scott, John Martin, S. B. Maxey, W. B. Wise, J. H. Johnson, J. A. Martin.

Portland & Clackamas.—The incorporators of this Oregon company are: William Reid, F. A. Habersham and D. W. Cummins.

Redondo Beach.—The officers of this California Company are: G. J. Ainsworth, President, L. Friel, Chief Engineer, and S. O. Brown, Vice-President and General Manager, all with office in Los Angeles, Cal.

St. Louis, Arkansas & Texas.—S. W. Fordyce, President, has been appointed Receiver of the road by Judge Brewer at Leavenworth.

St. Louis & San Francisco.—At the regular meeting of the stockholders held in St. Louis, May 8, 191,191 shares of stock were represented. The old Board of Directors was re-elected, as follows: William F. Buckley, George Coppell, Walter L. Frost, I. E. Gates, George J. Gould, Bryce Gray, C. P. Huntington, John O. Day, Horace Porter, John Paton, Jesse Seligman, Russell Sage and E. F. Winslow.

San Francisco & North Pacific.—A. B. Savell has been appointed Assistant Auditor of the above road.

San Pete Valley.—At the annual meeting held last week the old directors were re-elected.

Southern Pacific.—E. G. Bleker has been appointed General Freight Agent for the state of Texas, with office in Houston, Tex., in place of George Gerken, resigned.

Talbotton.—At the recent annual meeting, T. M. Gibson was chosen President, and S. W. Thornton Superintendent and Secretary and Treasurer, with office at Talbotton, Ga.

Terre Haute & Indianapolis.—Robert Thompson, who has been connected with the auditor's office, has been appointed Assistant Treasurer, with office in Terre Haute, Ind.

Texas, Sabine Valley & Northwestern.—C. W. Booth having resigned, the duties of General Freight and Passenger Agent of this company until further notice will be assumed by R. J. Evans, General Manager, with office in Longview, Tex.

Texas Trunk.—The new directors of the road are: S. H. Kneeland and F. L. Russ, of New York City; W. W. Weighly, of Philadelphia; J. E. Schneider, W. W. Leake, M. S. Mowry and T. L. Marsalls, of Dallas. The directors elected the following officers: S. H. Kneeland, President; J. E. Schneider, Vice President; W. S. Mowry, Treasurer and General Manager; P. A. Tucker, Secretary.

Transcontinental Association.—James Smith, the General Eastern Agent of the Transcontinental Association, has been appointed Temporary Chairman, with headquarters in St. Louis, Mo., to succeed J. S. Leeds, re-signed.

Union Pacific.—A. Woodcock has been appointed General Land Commissioner, with office at Omaha, Neb., in place of C. J. Smith, who has been appointed General Manager of the Oregon Railway & Navigation Co.

Utah Central.—The stockholders held their annual meeting May 6, and elected these directors: Charles Francis Adams, F. L. Ames and F. Gordon Dexter, of Boston; Sidney Dillon, New York, and G. M. Cumming, John Sharp, James Sharp, J. T. Little and J. A. Jennings, Salt Lake.

Wabash Eastern.—The incorporators and first board of directors of this Illinois company are: George W. Smith, Abram M. Hence, John Maynard Harlan and Charles Henrotin, of Chicago, and John W. Bunn, of Springfield, Ill.

OLD AND NEW ROADS.

New Companies Organized.—Central Pennsylvania—Cumberland & Big Gap.—Maryland Midland.—Philadelphia Belt Line.—Terminal Railroad Association of St. Louis.—Wabash Eastern.

Adirondack.—The purchase of the Adirondack road by the Delaware & Hudson Canal Co. is rumored. The Adirondack road runs from Saratoga to North Creek, Warren County, N. Y., a distance of about 58 miles. Several extensions are under consideration.

American Midland.—The stockholders of the road met this week in Findlay, Ohio, and authorized the directors to bond the line as far completed in a sum not to exceed \$50,000 for each mile now in operation. The proceeds will be applied to the liquidation of the floating debt and the extension of the line to Fort Wayne, Ind., in the West, and to Red Bank, Pa., in the East.

Baltimore & Delaware Bay.—The annual meeting was held last week. It was stated that the proposed extension to Tolchester, Md., will be built immediately. It is intended to spend \$100,000 in repairing the road. An entire new track is to be laid. The Diamond State Iron Works will furnish the iron supplies. It is expected to have the new road in running order by July 1. Freight and passengers can then be carried from Chestertown to Boston by train to Bombay Hook, and thence by floaters to Bay Side, N. J., there connecting with the New Jersey Southern road, and then by way of the Central of New Jersey to New York city.

Baltimore & Ohio.—It is stated that within a few days the Baltimore & Ohio will begin the construction of a connecting line in West Virginia, from Fairchance to Morgantown, which will unite the Baltimore & Ohio system in the South, and give Pittsburgh a direct line to the coal, iron ore, and coking coal fields of the region through which it will pass. The connecting link will be 17 miles in length.

Boston & Albany.—The statement of earnings and expenses of the Boston & Albany for the quarter ending March 31 shows:

	1889.	1888.	Inc. or Dec.
Gross earn.....	\$1,908,906	\$1,859,142	I. \$139,854
Oper. exp.....	1,414,808	1,493,564	736
Net earnings.....	\$584,188	\$365,578	I. \$218,610
Charges.....	223,829	205,158	18,671
Balance.....	\$360,359	\$160,420	I. \$199,939
Cash on hand.....	407,493	456,900	D. 49,407
Profit and loss def.....	537,977	607,735	D. 69,808

Bowling Green & Northern.—The locating survey for the line from Litchfield, Ky., on the Chesapeake & Ohio, to Seccville, Allen County, via Bowling Green on the Louisville & Nashville, is now about completed. The total length of the line will be about 65 miles. The estimates are now being made and as soon as completed the contract for grading the line will be let. The company is meeting wth much success in obtaining right of way, it being secured with but little trouble. M. H. Crump is Secretary of the company.

Buffalo, Lackawanna & Pacific.—Amended maps have been filed with the county clerks of Erie and Niagara counties. The route has been changed so as to run parallel with that surveyed for the West Shore for about 1½ miles from Black Rock, N. Y. to where the Lackawanna crosses the New York Central & Hudson River Road. The line as changed will be between that of the West Shore and the river. Col. J. E. McIntire, of Buffalo, is General Manager.

Burlington, Cedar Rapids & Northern.—The annual report for the year ending Dec. 31, 1888, shows that the total gross earnings were \$2,848,075; the total operating ex-

penses, including taxes, insurance and rentals, \$2,076,629, and net earnings, \$771,446.

Canadian Pacific.—The annual report shows the gross earnings for the year to have been \$13,194,535; working expenses, \$9,324,760; net earnings, \$3,870,774; deducting fixed charges, \$3,544,351, the surplus was \$326,423. The year's results have not been as good as expected, mainly owing to the light crops in Ontario in 1887. This was more than made good by the main line and through Pacific traffic, but the latter had to be carried at a small profit. The first quarter of the present year shows great improvement. The land sales last year were 138,000 acres, for \$443,526, as against 53,803 acres in 1887, for \$179,813.

President Van Horne said Sir Henry Tyler had said a great deal about the aggressiveness of the Canadian Pacific, and its extensions and acquisitions in Ontario, regardless of the fact that since the Canadian Pacific came into existence the Grand Trunk had absorbed in that province more than two miles of railway for every one made or acquired by the Canadian Pacific aside from its main line. The Grand Trunk, Mr. Van Horne said, talked a great deal about the subsidies the Canadian Pacific received, forgetting that in Ontario and Quebec the Grand Trunk had received many times the amount the Canadian Pacific received for its lines in these provinces, and that the Ontario & Quebec, between Montreal and Toronto, was built without any subsidies whatever. He concluded by stating that the Canadian Pacific had from its inception met with the determined hostility of the Grand Trunk in the Dominion and Provincial Parliaments, in the money markets, and in the press. Sir George Stephen said the Grand Trunk had done its best to discredit the company in London in order to prevent it getting the capital to build the line from London to Detroit, but that effort had miserably failed. Let Sir Henry Tyler accept the situation and recognize the Canadian Pacific as an independent well disposed neighbor.

Central of Georgia.—Tracklaying on the extension of the Buena Vista & Ellaville, between Columbus and Buena Vista, Ga., 33 miles, was completed May 9.

Central Pennsylvania.—Articles of incorporation filed in Pennsylvania to construct a road from a point at or near Mill Hall, Clinton County, Pa., to a point at or near Unionville, Centre County. The length of the road is to be 25 miles and the line runs through the counties of Clinton and Centre. The capital stock is to be \$500,000.

Chattanooga Southern.—About three miles of track has been laid on this road to Rock Creek, and the remaining two miles to complete the first section will soon be completed. This work is being done by the company's force. The company expects to place bonds on the line very soon, and to then let the contract for building to Anniston, Ala., via Cedar Bluff. J. C. Henderson, Chattanooga, Tenn., is General Manager.

Chicago & Atlantic.—The Central Trust Co., of New York will file a petition asking Judge Gresham to appoint a Receiver. Trustees for the first mortgage bondholders and many of the second mortgage bondholders are also interested in the proceedings. While a default in the interest is the reason assigned for the action, the real course is thought to be that an appeal has been granted certain bondholders in a recent decision of the United States District Court, which would delay the reorganization several years. Under the proposed plan of reorganization there was to be a new issue of bonds to the amount of \$12,000,000 bearing four per cent. interest the first five years and five per cent thereafter, until due, to be guaranteed by the New York, Lake Erie & Western. There is also to be issued \$10,000,000 five per cent. non-cumulative bonds.

Chicago, Burlington & Quincy.—The company has secured extensive terminal facilities in the city of St. Louis. It has bought 400 acres, extending from Hall street east to the river, embracing the entire river front. Freight terminal facilities have been secured at Main and Franklin streets, where the company owns a site for a freight depot 140 by 900 ft. The press reports state that the company will construct a bridge across the Missouri River south of St. Charles, and build an independent line to the company's property.

Cleveland & Canton.—Work on the Chagrin Falls extension of the road has been temporarily abandoned.

Cleveland, Cincinnati, Chicago & St. Louis.—Judge Stevenson Burke, on May 11, brought suit against the Cleveland, Columbus, Cincinnati & Indianapolis road, in the Common Pleas Court, at Cleveland, to prevent the proposed consolidation with the Cincinnati, Indianapolis, St. Louis & Chicago. By agreement of attorneys, however, the Courts permitted the stockholders of the Cleveland, Columbus, Cincinnati & Indianapolis to meet in Cleveland and vote upon the proposition to consolidate with the "Big Four." Of the 150,000 shares, 122,933 were voted, all being in favor of the consolidation, no negative votes being cast. The Cincinnati, Indianapolis, St. Louis & Chicago Railroad stockholders voted unanimously in favor of the consolidation, the details of which have already been published.

Cleveland, St. Louis & Kansas City.—The contractors for the road, Wm. Baird & Co., have abandoned the contract and turned the road over to J. C. Hayward, the engineer. Work has been suspended several days, owing to a lack of funds. All claims for labor had been settled up to May 1. The company will settle with the retiring contractors for the work already completed, six miles of track and 56 miles of grading. New arrangements will then be made, and it is expected that work will be resumed under a new contract within ten days. Ten miles of track had been completed before the Baird contract was commenced. The road is now graded for 10 miles east of St. Charles, Mo., and 52 miles west. It is completed to Hamburg, 16 miles west of St. Charles, and trains are now running between those points for the accommodation of local business. Messrs. Baird & Co. will settle all claims against them in a few days, and there will be no debts whatever arising from the work of construction or any other feature of the contract. The labor claims since May 1 have also been paid.

Columbus & Cincinnati.—This company has applied for permission to increase its capital stock to \$2,800,000, and to build southeast to the state line.

Columbus, Lima & Milwaukee.—It is stated that work will be commenced on the middle division of this road, from Columbus to Defiance, Ohio, 125 miles, not later than June 1, by the contractor, Stephen G. Clarke, 1,525 North Halstead street, Chicago.

Confluence & State Line.—Kennedy & Crossan, of Philadelphia, have the contract for building this short Pennsylvania road, which has already been described. James Crawford, of Fox Chase, Philadelphia, Pa., is Chief Engineer.

Cumberland & Big Gap.—Chartered in Tennessee to build from near the southern end of the Cumberland Valley branch of the Louisville & Nashville, at or near Cumberland Gap, in Claiborne County, to a point on the line between the states of Tennessee and Virginia, in Claiborne

County, so as to connect the Cumberland Valley branch of the Louisville & Nashville Road with a line of any company of Virginia.

Denver & Rio Grande.—The extension from Glenwood Springs, Colo., to New Castle was opened May 11. Workmen are laying the third rail on the Denver & Rio Grande below Glenwood Springs.

Dexter & Piscataquis.—The company has placed the entire issue of its bonds in Boston at a price satisfactory to the company. Work on the road is now being pushed and the contractors will have it completed by the time specified in their contract.

Dodge City, Montezuma & Trinidad.—The company expects to let contracts soon after June 20 for grading extensions of the road, which is now in operation from Dodge City to Montezuma, Kan., 27 miles. The survey west from Montezuma has been completed for 100 miles. Trinidad, Col., is the proposed western terminus. W. W. Munsell, Dodge City, Kan., is the Secretary and Treasurer.

Evansville, Ft. Wayne & Chicago.—The projectors announced that the work of building the line, 109 miles in length, on the towpath of the Wabash Canal between Ft. Wayne and Lafayette, Ind., will be begun within 30 days, ample funds for that purpose having been raised. Keene Bros., of St. Louis, are the contractors.

Florida.—Bills have been introduced in the legislature of Florida to incorporate the West Florida & Alabama Railroad Co., the Fernandina & Suburban Railway Co., and the Manatee River Railway & Navigation Co.

Forest City & Watertown.—The engineer corps has been for some time engaged in running lines through the great Sioux Indian Reservation in Dakota, from Forest City toward the Black Hills. They report that an easy grade has been secured through timbered country. Work will be soon resumed on the line between Gettysburg and Forest City, bids for grading being asked.

Freehold & New York.—Contracts for the extension to Atlantic Highlands, N. J., a summer resort on the bay shore, will soon be let. Part of the line from Keyston is now under contract. The new road will cross the New York & Long Branch at Matawan, from which point cars of that road will run over the new line to Atlantic Highlands, materially reducing the time from New York.

Galveston & Western.—The stockholders have voted to increase the capital stock from \$240,000 to \$320,000. The franchise of the Texas Mexican Railroad has passed into this company's hands. Extensions will be built, new equipment will be bought, and other improvements will be made. The annual meeting will be held in Galveston June 11.

Georgia Pacific.—Gibson & Corpening, of Birmingham, Ala., have contracted to build a 14-mile branch in north Alabama.

Georgia Southern & Florida.—The company has made the following proposition to the people of Thomasville, Ga. If they will raise within thirty days \$25,000 aid to the road, the company will agree to build a railroad from some point on the line to Thomasville by Nov. 15, next, the \$25,000 then to be given it, and four acres of land close in for terminal purposes, together with right of way through the city. It agrees further to spend the \$25,000 on work in Thomasville, and to put \$15,000 into a passenger depot.

The entire extension from Valdosta, Ga., to Palatka, Fla., is now under contract. Morgan & Reynolds, of Macon, Ga., have the contract for grading all the line, and E. B. Waters for the ties. The trestles are also all contracted for. About 30 miles of line is now ready for track laying, which was commenced May 11, at Valdosta, and at Lake City, Fla. The contractors are to complete not less than 15 miles a month. W. H. Wells, of Macon, is Chief Engineer.

Grafton & Upton.—Newell & Snowing, of Uxbridge, Mass., were last week awarded the contract for building the extension from West Upton through Hopkinton to Milford, Mass. The distance is about eight miles. The construction of the line was begun May 13, and it is to be completed by next October. H. P. Bean, of Grafton, is Chief Engineer.

Harrisburg & New England.—A bill in equity filed at Easton, Pa., by the company, to restrain the Pennsylvania, Poughkeepsie & Boston from using lands surveyed and to be used by this company in Northampton County, and referred to in these columns under the name of the latter company, gives a history of this company. It was organized on Nov. 5, 1886, purchased the rights and franchises of the Susquehanna & Delaware River, acquiring the franchises and property of the Pennsylvania & New England, who in like manner acquired all the franchises of the Pennsylvania, Poughkeepsie & New England. The object of the company is to construct the railroad from Harrisburg to Portland, on the Delaware River. It has surveyed a route through Dauphin, Lebanon, Berks, Lehigh & Northampton counties, upon which much grading has been done, and within the last nine months has surveyed, relocated and prepared for contracts that portion of the road through Northampton County.

Hartford & Connecticut Western.—The hearing upon the proposed bond issue before the Legislative Railroad Committee was held last week. The railroad's representative stated that the directors, having seen how strong the feeling was in certain directions that the road ought not to be further mortgaged, had decided to expend the money out of their own pockets, and that at some future date they might ask to be allowed to issue bonds, after having shown the public that they were acting in good faith. He requested the committee to submit an unfavorable report, with the statement that they did so at the request of the petitioners. This the committee agreed to do.

Hudson Connecting.—Track is now all laid on the road from Campbell Hall, northeast, to the Poughkeepsie Bridge. The bridge will be opened for traffic May 25.

Ilwaco Railway & Navigation Co.—The extension of the road between Ilwaco, Wash. Ter., and Sea Land, the new terminus on Shoalwater Bay, is being rapidly pushed to completion. This extension will make the length of the road 20 miles, the terminus being within two or three miles of Oysterville. The grading is all finished and the track has been laid a distance of 15 miles. It is expected that the line will be completed this month. The road runs parallel with the shore of the bay almost the entire 20 miles.

Jacksonville, Williamsport & Atlantic.—The survey for this road has just been completed, and it is expected to let contracts by June for constructing the line. It is to extend from Anniston, Ala., through Jacksonville to a connection with the East and West of Alabama, a distance of 20 miles. Bonds at the rate of \$12,000 a mile will be issued; towns along the proposed route have voted aid to the extent of \$150,000, and right of way has been secured. Timber, iron ore and other minerals will form the bulk of the traffic. James Crook is President and J. A. Gaboury is Chief Engineer, both of Jacksonville.

Louisville, New Orleans & Texas.—On the Helena branch, 4 miles long, engineers are now planning the inclines by which cars will be run to and from the Mississippi River transfer boats, the most important part of the work. This will connect the Louisville, New Orleans & Texas with the Arkansas Midland, and give the former road a short line to St. Louis. The statement that a line 50 miles long, from Yazoo Pass down the Coldwater, Tallahatchie and Yazoo rivers, will be built this season, is incorrect. The company has no intention of building over this route.

Maine Central.—A press report states that the company has begun grading at Fabyan's, N. H., on an extension of 10 miles from Fabyan's westward to Scott's, where connection will be made with St. Johnsbury & Lake Champlain, which is a part of the Boston & Maine's Vermont system. This is, it is said, in consequence of the recent decision of the New Hampshire Supreme Court, by which the Boston & Maine will probably lose control of the Boston, Concord & Montreal.

Maryland Central.—The announcement has been made that on May 19 trains will be run through between Baltimore and York, Pa., on the Maryland Central and York & Peach Bottom railroads. The Maryland Central has indorsed \$300,000 five per cent. bonds of the Deer Creek & Susquehanna road, now building from Belair to the Susquehanna River at Stafford. It is understood the extension is to be pushed on to connections that will reach the Pennsylvania coal fields.

Maryland Midland.—This company has been chartered in Maryland for the purpose of constructing and operating a railroad, to commence at a point on or near the Green Spring branch of the Northern Central between Roger's Station and the junction of the Western Maryland to extend through a tract of land known as "The Caves," thence northerly to the state line; all the line is in Baltimore County. The capital stock is placed at \$50,000.

Missouri, Kansas & Texas.—An answer was filed this week in the suit of the Missouri, Kansas & Texas against the Mercantile Trust Co., the Missouri Pacific, the Union Trust Co., Jay Gould, John Sevier, J. Alfred Davenport, Christian Zabriskie and Edward H. Van Winkle. The document is the answer only of the four last-named defendants. They admit that all the coupons on the mortgages referred to in the suit, which matured in June, 1888, are in default and unpaid. The default is alleged to be caused by the great decline in freight and passenger rates on the road. They allege also that similar actions are pending in the United States Circuit Court of Kansas and New York and in the Supreme Court of New York. The defendants also admit that the amount of the various charges by way of interest on the indebtedness of the complainant exceeds the sum of \$2,600,000, but they deny that the net earnings after the payment of the expenses of operating and maintaining its road and paying its taxes, do not exceed the sum of \$1,500,000 per annum. They deny also that the enforcement of any lien or charge of the defendants or of either of them will impair any public interests, as averred in the bill of complaint.

A cross bill of complaint was also filed by the same defendants against the Missouri, Kansas & Texas Railway Co., the Mercantile Trust Co. and the Union Trust Co. In this complaint a history of the transactions by which the St. Louis, Iron Mountain & Southern gained control of several Western companies is given. The leases and arrangements of such roads, it is charged, were accomplished with detrimental effects to the roads, and it is charged that Jay Gould and the Missouri Pacific, with intent to conceal the excess of earnings, diverted the excess, caused false entries to be made in the report of the Missouri, Kansas & Texas from 1882 to 1887, and also caused the statement to be made that the charges against that company were nearly \$4,000,000 greater than in fact. It is asked that certain demand notes of the Missouri, Kansas & Texas for \$520,000 be declared void and that receivers be appointed.

Napanee, Tamworth & Quebec.—Mitchell & Co., of Napanee, Ont., the contractors for the extension from Tamworth westerly to Tweed, Ont., have about half of the 20 miles graded. The line connects with the Canadian Pacific at Tweed. The firm also has the contract for the line from Yarker easterly seven miles to Harrowsmith, connecting there with the Canadian Pacific.

New Roads.—The town of Boothbay, Lincoln County, Maine, has voted to have a survey made from that place, north, to Wiscasset on the Knox & Lincoln Railroad. The distance is about 10 miles, and the survey is now in progress.

George Cox has just completed a preliminary survey for a road from Kearney, Neb., in an easterly direction to Pro ser, the present terminus of the Missouri Pacific in Nebraska.

A company has been organized to build a road from Rockford, the terminus of the Oregon Railway & Navigation Co.'s road and the Union Pacific system to Spokane Falls, Wash. Ter. The capital stock is \$5,000,000 and the distance is about 25 miles.

New York Central & Hudson River.—The earnings and expenses for the three months and the six months to March 31, were as follows:

	1889.	1888.	Inc. or Dec.
Gross earnings.....	\$8,033,478	\$8,152,796 D. \$119,318	
Operating expenses.....	5,501,168	5,802,028 D. 309,920	
Per cent. expenses to earnings.....	68.47	71.16	
Net earnings.....	\$2,532,370	\$2,350,768 L. \$181,602	
Fixed charges.....	1,963,260	1,954,860 L. 8,400	
Deficiency.....	\$325,173	\$498,375 D. \$173,202	
	1889.	1888.	Inc. or Dec.
Gross earnings.....	\$17,204,368	\$18,173,022 D. \$968,654	
Operating expenses.....	11,472,748	12,272,538 L. 799,790	
Per cent. expenses to earnings.....	66.68	67.53	
Net earnings.....	\$5,731,619	\$5,900,483 D. \$168,864	
Fixed charges.....	3,926,520	3,909,720 L. 16,800	
Surplus.....	\$16,553	\$202,197 D. \$185,664	

New York, Chicago & St. Louis.—The statement of the earnings and expenses for the quarter ending March 31 shows:

	1889.	1888.	Inc. or Dec.
Gross earnings.....	\$1,243,192	\$1,312,051	D. \$68,859
Oper. expenses.....	978,457	1,007,062	D. 28,603
Fixed charges.....	\$218,411	\$250,034	D. \$22,523

Net income..... 16,323 54,054 D. 37,731

Cash on hand..... 448,345 639,943 D. 191,598

Profit and loss sur..... 1,015 203,173 D. 202,158

New York, Lake Erie & Western.—The road is reported to be surveying a line to Bound Brook, N. J., starting from its own road near Newark. The object is to secure a connection with Philadelphia, over the Philadelphia & Reading.

Norfolk & Western.—It is reported that the road has bought at a cost of \$1,000,000, 235 acres of land near Iron-ton, Ohio, as a sight for repair shops and round house for the

proposed West Virginia & Ohio road, from the Flat Top coal field to the Ohio River. Engineers are now making examinations at the Ohio River, with a view to determining the probable cost of a bridge at that point. The preliminary estimates are that about \$600,000 will be required to build and equip the road and provide the necessary terminals and connections. The road is to be 190 miles long, and cannot be built in less than two years, and as it will run through a rich mineral and timber country, its local traffic will be developed as construction proceeds.

Northern Pacific.—Work on the Little Falls cut off line has been commenced by Winston Bros., of Minneapolis, who have the contract. The contract will probably be let immediately for building the line from near Gallatin, Mont., through the Homestake Pass to Butte, Mont.

Ontario, Carboneille & Scranton.—The Scranton & Forest City, the Forest City & State Line, and the Hancock & State Line roads, on which the grading is about to begin, have been consolidated as the Ontario, Carboneille & Scranton. The new line will give the New York, Ontario & Western an entrance to the anthracite coal fields. It is stated that contracts for carrying 500,000 tons of coal annually have already been made.

Oregon & Transcontinental Co.—A temporary injunction was issued in New York this week, on application of Elijah Smith and Edward R. Bell, stockholders in the Oregon Railway & Navigation Co., restraining, until further hearing, the proposed issue of new stock by the Oregon Transcontinental Co., and also restraining any pledge or other disposition by that company of its holdings of the Oregon Railway & Navigation Co.'s shares. The authorized capital stock of the Oregon & Transcontinental is \$50,000,000. The amount heretofore issued is \$40,000,000. It was reported May 11, by telegrams from Portland, O., that on May 10, at a meeting of the directors it was resolved, pursuant to telegraphic instructions from Mr. Henry Villard, that the remaining \$10,000,000 of authorized capital stock should be issued at once; that the company should guarantee dividends at 6 per cent. upon this \$10,000,000, and that \$12,000,000 of Oregon Railway & Navigation stock held by the Oregon & Transcontinental should be hypothecated to secure the payment of the dividends which were to be guaranteed on the new issue. It is alleged by plaintiffs that the Oregon & Transcontinental has no authority in law to give such a preferred right to any portion of its stock; that Mr. Villard's purpose was to place the stock where he could control its proxies and the election on June 17 and also with the money thus obtained to increase the amount of the Northern Pacific shares now held by the Oregon & Transcontinental to enable him by that means to control the next Northern Pacific election and drive out of that company's Board those directors who have heretofore in that Board been a check upon his schemes. The attorneys further believe that his success in this regard would expose the Oregon & Transcontinental to annulment of its charter for holding, contrary to the laws of Oregon, control of two parallel and competing roads, the road of the Northern Pacific and the road of the Oregon Railway & Navigation Co. Later in the week a modification of the injunction was made. It was applied for by Charles W. Wetmore, representing the defendants, and removes the restriction against using the \$12,000,000 of stock for any object other than the furtherance of the plans complained of.

The answer of the defendants states that no issue of preferred stock in the advance of the election was intended and that no step was taken with such an end in view, except the passage of a resolution conferring authority of a preliminary nature on the Executive Committee, to take the necessary steps for such an issue. It was intended to submit the matter, as required by the laws of Oregon, to the stockholders' meeting, and the resolution was passed in order that the preliminary steps might be taken and the papers prepared for that purpose.

Pennsylvania.—The \$12,000,000 which the company is to expend for improvements along its line is to be spent as follows: Construction of third and fourth tracks and additional facilities on the Pennsylvania Railroad, branches and leased lines, \$3,500,000; real estate, Pennsylvania Railroad, branches and leased lines, \$2,600,000; locomotive and passenger equipment, \$4,400,000; construction of branch and auxiliary lines in addition to those now in operation, \$1,500,000; total, \$12,000,000. The company will, during the year, expend \$3,000,000 of the money raised by the stock allotment and sale of the assets in improvements and betterments to the Western lines. For a large portion of this the Pennsylvania receives stock or bonds from the companies benefited, and to that extent the expenditures will be an investment. One of the purposes in view when the allotment was decided upon was the construction of a railroad to League Island, in the Delaware River near Philadelphia, which would give the company practical control of the river front.

Pennsylvania, Poughkeepsie & Boston.—It is said that it is probable that work will be stopped on the section between Portland and Slatington, Pa., and the commencement of work on the section from Slatington to Harrisburg, delayed, in consequence of the bill filed by the Harrisburg & New England in the Court of Chancery. The latter company contends that it has the title to the right of way, by purchase and otherwise. It states that it has made surveys of the entire line from Portland to Harrisburg and done considerable grading, and that numerous contracts have been given out. In view of these facts it claims that the title of the Pennsylvania, Poughkeepsie & Boston is not valid.

Philadelphia Belt Line.—Chartered in Pennsylvania, with a capital stock of \$200,000, to construct a road from a point on the Schuylkill River near the Atlantic Refinery in the city of Philadelphia, along streets, avenues and private property, following the courses of the Schuylkill River and Delaware River to a point near Cottman street, in the 23d ward of the city. The length of the railroad will be about 18 miles. When completed the road is to be turned over to the city in trust for the impartial use of all railroads that desire, or shall hereafter desire, to connect with it. It has been discovered that there is room enough on Delaware avenue for an additional track.

Philadelphia & Reading.—A corps of eight engineers, under Assistant Engineer Frank H. Thomas, have been at work this week surveying a line from Lofty to Driftton, Pa., through Hazleton for the proposed branch which is to extend to Cox Bros. & Co.'s and other coal collieries in that vicinity.

Pittsburgh, Cadiz & Ohio.—Work was begun last week on the Pittsburgh, Cadiz & Ohio road. This is the fifth road of the Black Diamond system, and will run from Pittsburgh through Cadiz, Freeport, Washington, McConnelville and Athens, terminating at Maysville, Ky.

Plymouth & Middleboro.—The preliminary surveys for this road has been completed. It is to be built from Plymouth west through Carver to Middleboro, Mass., a distance of about 15 miles. If built the road would give Plymouth a direct connection with Taunton, and other towns west. T. D. Shumway is President, and James M. Hodge is Chief Engineer. The office is at Plymouth.

Portland & Clackamas.—Incorporated in Oregon to build the following lines of railroad in Clackamas County from the Portland & Willamette Valley road near Oswego, to the Suspension Bridge, and thence across the Molalla River and southwesterly to a connection with the Oregon & California road in Marion County; in Multnomah County, from East Portland easterly via Powell's Valley and across Clackamas County to the Sandy River by a line already surveyed to the base of Mount Hood, a distance of about fifty miles, with a branch line from the Powell's Valley line to an intersection with the first line near upper Clackamas River; also to acquire and operate running powers over the main line of the Portland & Willamette Valley into Portland and to acquire any railroad in Oregon by purchase, lease or otherwise. The principal office will be in Portland. The amount of capital stock will be \$500,000.

Port Jervis, Monticello & New York.—The New York, Lake Erie & Western has informed the Port Jervis, Monticello & New York Co. that it will hereafter discontinue the terminal facilities of the latter at Port Jervis, N. Y., and will not permit its trains to enter or leave its station there. The companies have lately been engaged in litigation regarding this matter, which was decided in favor of the New York, Lake Erie & Western.

Providence & Worcester.—The Massachusetts House, by a vote of 111 to 24, has passed the bill authorizing the company to lease its road to the New York, Providence & Boston.

Puget Sound & Gray's Harbor Railroad & Transportation.—Proposals were let on May 11 for grading a line from Summit Station to Montesano, Chehalis County, Wash. Ter. William Renton is President and T. J. Milner, of Seattle, is Superintendent.

Red River, Sabine & Western.—The proposition of the city of Palestine, Tex., to take \$20,000 of stock, \$20,000 of bonds and donate 20 acres of land for depot and shop ground to the road has been accepted. The survey of the line through the country will begin inside of 15 days.

Rio Grande & Eagle Pass.—It is stated, and not contradicted, that this road has passed into the control of the Southern Pacific. It is built and in operation from Laredo, Tex., to coal mines near Santa Tomas, on the Rio Grande, about 27 miles above Laredo. It is stated that the Southern Pacific will assume control in June, when it will take steps looking toward extensions to Eagle Pass from Santa Tomas and to Brownsville from Laredo.

Rogers & Summit.—Organized in Georgia by O. Wadley, W. M. Stevens and others, to build a road from Rogers, Burke County, to Reidsville, Tattnall County, about 50 miles.

St. Joseph Valley.—Press dispatches state that work was commenced May 11 on a road from St. Joseph, Mich., to South Bend, Ind., a distance of 40 miles, the road to be completed and ready for rails by July 15, and trains to be running by Oct. 1. The line will, it is thought, be built next year to Fort Wayne, via Milford Junction.

St. Paul & Duluth.—President Hayes has issued a circular requesting proxies to be used at the annual meeting next month. The meeting, besides electing directors, will consider the question of changing the termination of the fiscal year to June 30, and the authorization of the issue of \$5,000,000 70-year bonds, proceeds to be used in retiring \$4,000,000 old bonds and \$780,000 preferred stock.

Sandusky, Ashland & Coshocton.—Keating Bros. & Co., of Pittsburgh, have the contract for building the road from Sandusky southeast to Norwalk, Ohio, about 20 miles. The indications are that the work of construction will be commenced within a couple of weeks on this portion of the road, which has already been surveyed. Meetings are still being held along the line to secure subscriptions to the bonds of the company. W. D. Crane, of Sandusky, is President.

Savannah, Americus & Montgomery.—The work of changing the gauge of the road from narrow to standard is progressing rapidly, and at the present rate the entire work will be finished in a few weeks. Ten miles of standard track has already been laid on the east end and nearly half as much more out of Americus. Train loads of rails and other material necessary are being distributed along the line.

San Antonio & Aransas Pass.—The Houston extension will be opened to that place May 15, and the force that has been working on the line will be moved to Shiner, where they will begin tracklaying on the extension from that place to Austin. The line will be completed north to Lockhart, Caldwell County, by Sept. 15. On the Waco extension from West Point, Tex., toward Waco, the graders are now scattered along a distance of 12 miles and within the next 20 days track will be laid to Cameron on the Gulf, Colorado & Santa Fe, via Rockdale on the International & Great Northern, and into Waco within less than 60 days. Construction will be pushed on this extension so as to reach Waco not later than Oct. 1, at which point it connects with the St. Louis, Arkansas & Texas and Missouri, Kansas & Texas. On the extension from a point on the Guadalupe River, 40 miles northwest of San Antonio, near Comfort, to Llano, about 30 miles of track has been laid. The contractors, Johnson & Hanson, of San Antonio, have grading in progress on the line from Comfort through Kendall County to Fredericksburg. The entire line to Llano through Gillespie County will be graded within eight months, and the road in operation to that point by May 1st, 1890. The distance is 70 miles.

The company is also having a preliminary survey made from Kenedy, a point 62 miles south of San Antonio, on the main line, to Laredo, a distance of 135 miles, which it hopes to put under construction the present year. The company will also, during the present season, commence the construction of a line from Houston, either to Alexander or to Llano, the latter point being distant about 190 miles, and the former about 300 miles. The entire length of this line will be through the long leaf pine district of Eastern Texas and Western Louisiana, and a good portion of the distance is through a rich farming region. From this line the company will be able to furnish the rapidly developing country along the 800 miles of its own system with pine products, and it will also compete for traffic to and from Mexico, the route over its road being the shortest between the Mississippi River and the City of Mexico.

The Hopkins Bridge Co., of St. Louis, has the contracts for most of the bridges on the line. On the Austin extension a bridge is under contract to be erected over the Colorado River at a cost of \$100,000. There are seven iron bridges on this road, and with the exception of the ones across the San Antonio, Colorado and Neches rivers, are all built on stone abutments. The spans are from 125 to 250 ft. U. Lott is President and B. F. Yoakum is General Manager.

Southern Pacific.—The company has proposed to the citizens of San Luis Obispo, Cal., and vicinity that, if they will purchase and donate to the company the right of way for its railroad from the west side of the Cuesta Mountains,

in San Luis Obispo County, to and through the city, and lands within the city necessary for machine shops and station grounds, the railroad company will, with delay, build and construct its railroad from Santa Margarita to San Luis Obispo.

South & North Alabama.—The City Council of Montgomery, at a special meeting last week, adopted a resolution agreeing to accept 22 cents on the dollar from the Louisville & Nashville for all the bonds of the South & North Alabama railroad held by the city, in full compromise and settlement of the suit now pending in the Supreme Court between the city and the Louisville & Nashville.

Springfield & Connecticut.—The location of this extension of the Hartford & Connecticut Western from Tariffville, Conn., to Springfield, Mass., about 20 miles, will be finished in about 30 days, when the profiles will be ready for the contractors. P. P. Dickinson, of Hartford, is Chief Engineer.

Sulphur Springs and Red River.—This company has been organized at Sulphur Springs, Tex., to build a railroad from that point north to Cooper, Tex. J. A. B. Putnam and C. B. Stevenson, of Sulphur Springs, and J. N. Boyd, of Cooper, Tex., are among the incorporators.

Terminal Railroad Association of St. Louis.—This company has been formed by the consolidation of the Union Railway & Transit Co., of St. Louis, and the Terminal Railroad, of St. Louis. The new company is to purchase the Union Railway & Transit Co., of East St. Louis, the Terminal Railroad of East St. Louis, the Union Depot, at St. Louis, and the grounds connected therewith. It is to secure the transfer to itself of the lease of the bridge and tunnel property now held by the Missouri Pacific and the Wabash, St. Louis & Pacific, assuming the obligations under that lease, which to the new company will amount to about \$670,000 per year. The purchase money is to be provided by the issuance of \$7,000,000 4½ per cent. bonds, of which \$5,000,000 goes to pay for the property of the Union Railway and Transit companies, the Terminal companies, and the Union Depot, and real estate in St. Louis. After the reorganization of the new company, each of the seven proprietary companies, the Wabash, Missouri Pacific, Indianapolis & St. Louis, Ohio & Mississippi, Louisville & Nashville, and St. Louis, Iron Mountain & Southern, is to guarantee one-seventh of the obligations incurred by the new company, each is to have one-seventh of the capital stock, which is to be non-transferable, and is to name an officer for a director. In addition to these seven directors there is to be one elected by the whole number, who is to serve as President.

After the organization of the new company in this way the consideration of the question of the location and the building of a new depot is to be taken up and settled and the balance of the \$2,000,000 bonds applied to the purchase of such additional real estate as may be needed to the building of a new union depot and to the laying of additional tracks.

Texas, Sabine Valley & Northwestern.—A meeting of the owners of this road will be held in New York early in June to act upon the immediate extension from Carthage, 22 miles to Logansport, La., where the Houston East & West Texas and Shreveport & Houston roads connect.

Texas Western.—This narrow gauge road, which extends from Houston to Sealy, Tex., 53 miles, was sold at public auction at Houston, May 7, to satisfy a mortgage of \$350,000 executed in 1878 in favor of P. W. Smith of Boston; also, \$11,000 receivers' certificates. The road was bought in for \$200,000 for Elijah Smith.

Texarkana & Daingerfield.—This company has been incorporated to build a railroad from Texarkana to Daingerfield, Tex. The capital stock is \$150,000.

Toledo & Ohio Central.—At a special term of the New York Supreme Court, Judge O'Brien has rendered a decision in the suit of David H. Gould, a stockholder, against George I. Seney, Samuel Shethar, the Metropolitan Bank and Ohio Central Railroad Company for an accounting of a fund of \$5,000,000, with which Seney and Shethar were entrusted for the purpose of constructing links of road which would connect with the Ohio Central, Atlantic & Northwestern and the Richmond & Alleghany railroads. The court holds that there was no evidence of fraud, but believes that the plaintiff is entitled to an accounting, and therefore grants him an interlocutory judgment and accounting.

Union Pacific.—About two-thirds of the Eureka branch of the Salt Lake & Western has now been graded, but the company has not been able to secure the right of way into Eureka, Utah, and will have to institute legal proceedings. As already stated, S. Bamberger, of Salt Lake City, has the contract.

Utica & Unadilla Valley.—J. A. Seno, 400 Grand street, New York, has been awarded the contract for the grading and masonry on this road, which is to be built from Bridgewater, N. Y., to New Berlin, about 18 miles. Albert C. Couch, of Bridgewater, is President. The New York office is at 146 Broadway.

Wabash.—The Wabash Western Purchasing Committee bought nine divisions of the Wabash Railway for \$15,000,000 at the sale in Chicago, May 15. In March, in Springfield, they bought the Chicago Division for \$8,000,000. This sale gives them complete control of the whole Wabash system. According to the terms of the decree rendered by Judges Gresham and Jackson, the road was sold first by divisions and then as a whole. The sale bringing the most was to be the legal one. The only bidders were the Popper-Johnson syndicate, representing the minority bondholders, and the Wabash Western Purchasing Committee. The Popper-Johnson syndicate were the successful bidders on the first three divisions, as follows: Indiana division, \$3,650,000; Great Western (Illinois division), \$3,650,000; Detroit & St. Louis, \$4,000,000. The Wabash Western Purchasing Committee were the successful bidders, contingent on the amount bought by the road as a unit for the other divisions, as follows: Quincy & Toledo, \$500,000; Illinois & Southern Iowa, \$300,000; Hannibal & Naples, \$500,000; Ohio division, \$2,840,595.68; two small branches, \$100,000; total, \$15,540,595.68. The upset price fixed in the decree was \$15,335,000 and the sale thus made would have stood had not James F. Joy of the purchasing committee bid \$15,550,000 for the road as a unit. There was no other bid and the road was knocked down at the unit price. President Ashley said of the Wabash Western after the sale: The amount brought by the sale is to secure the first and second mortgages on the Ohio division, and the first mortgages on all the rest. We have already issued and sold \$34,000,000 fifty-year 5 per cent. bonds on the consolidated system. Of this amount, \$11,741,000 will be used to pay off the first mortgage bonds of the Wabash Western. This leaves \$22,259,000 mortgage on the line east of the Mississippi River. To this we will add \$14,000,000 second mortgage 50-year 5 per cent. bonds, making a total bonded indebtedness of \$36,259,000 on the line east of the Mississippi. To this, however, should be added the \$30,

000,000 debenture bonds, depending on the income of the road. There is also \$52,000,000 in stock. We shall consolidate the Wabash and Wabash Western into one system by Aug. 1, and will probably call it the Wabash Railroad Company. The headquarters will be in St. Louis, and the consolidated system will be under the present Wabash Western management."

Wabash Eastern.—Articles of incorporation of the Wabash Eastern Railway Company, of Illinois, have been recorded. The principal business office will be at Chicago. The capital stock is \$12,000,000. It is proposed to construct a road from the eastern boundary line of Illinois in Vermilion County at a connection with the Wabash, St. Louis & Pacific, at the point where it enters Illinois from Indiana, and to extend thence westerly through the counties of Vermilion, Macon, Sagamon, Morgan, Scott, Pike, Brown, Hancock and Adams to the Mississippi River at or near East Hannibal, Warsaw, Quincy and Hamilton; also from the city of Decatur, through the counties of Macon, Christian, Montgomery, Macoupin, Madison and St. Clair to the Mississippi River, at or near East St. Louis; also from the city of Chicago, through the counties of Cook, Kankakee, Livingston, McLean, Champaign, Pratt, Moultrie, Shelby and Effingham to the line of the Chicago branch of the Illinois Central at Effingham, and the line of the Ohio & Mississippi at Altamont. This covers all the lines owned and controlled by the Wabash east of the Mississippi River, and is a preliminary step toward the reorganization and consolidation of the Wabash lines east and west of the Mississippi. Similar incorporations of the lines of the system in Indiana and Ohio have been also made.

Warren Iron Co.—Davis & Carty of Nashville, Tenn., have the contract for building a seven mile railroad for this company from Dickson, Tenn., southwest to Worley Furnace, to develop the iron ore and timber lands about Dickson owned by the company. When finished the road will be operated by the Nashville, Chattanooga & St. Louis, J. C. Warner, of Nashville, is President of the Warner Iron Co.

Washington County & Rutland.—The survey for the railroad has proceeded as far as East Poultney, Vt., from Greenwich.

Wyoming, Salt Lake & California.—The company has bought the old road bed into Park City, Utah, of the Utah & Eastern road, and the entire line between the Wyoming line, Coalville, Park City and Salt Lake is now carefully fully surveyed. The Salt Lake, Nevada & California road has been graded altogether eight miles between Salt Lake City and Lake Point.

TRAFFIC.

Traffic Notes.

The Northern Pacific has given notice of withdrawal from the Transcontinental Association. This is understood to be in consequence of the action of the Union Pacific, above mentioned.

Chicago dispatches state that the Lake Michigan and Lake Superior Transportation Co., running boats between Chicago and St. Ignace, has made a contract with the Canadian Pacific by which freight will be taken from Chicago to the Atlantic seaboard over the line of the latter company.

The Alabama Railroad Commission has ordered the East Tennessee, Virginia & Georgia and the Cincinnati, Selma & Mobile to make joint rates between Selma and Marion Junction, which shall not exceed the rate charged by the latter company between those points on April 15 last. The Board recommends that the division of the revenue be on the basis of 22 per cent. to the former road and 78 per cent. to the latter.

A Chicago dispatch of Wednesday states that the committee appointed by the general managers of the Inter-state Commerce Railroad Association to look into the coal and coke manipulation, has reported that there is conclusive evidence of manipulation against the Northwestern, St. Paul, Rock Island and Wisconsin Central roads. The Association voted to apply the highest penalty, \$100 fine and a forfeiture of all money made on the illegal traffic. The manipulations amount to the neighborhood of \$4,000.

The Transcontinental Association had a meeting in St. Louis, May 11, and reduced the rate on canned fruits and salmon from Pacific Coast points to Chicago from \$1 20 to \$1 per 100 lbs. The question of passenger rates from the East to Puget Sound points, which have been disturbed by the action of the Union Pacific in reducing fares to that territory, by way of its Oregon Short Line, was taken up and discussed, but not settled. The meeting adjourned to meet in Tacoma, Washington Territory, July 20.

Inter-state Commerce Commission.—On May 10 the Commission published an opinion, prepared by Commissioner Bragg, on the complaint presented by William H. Heard against the Georgia Railroad Co. for discrimination in passenger accommodations. The case is almost identical with that presented by the same complainant last year and decided upon at that time. The Commission holds that the accommodations for white and colored passengers must be equal in all respects, and that protection from the disorderly or annoying conduct of other passengers must also be afforded to all passengers alike. The defendant is found to have violated the law in each of these respects as against the petitioner. Mr. Heard did not ask for pecuniary damages.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all lines for the week ending Saturday, May 11, amounted to 41,985 tons, against 36,591 tons during the preceding week, an increase of 5,344 tons, and against 46,442 tons during the corresponding week of 1888, a decrease of 4,507 tons. The proportions carried by each road were:

	Wk to May 11.		Wk to May 4.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	4,440	10.5	3,643	10.0
Wabash	4,013	9.5	3,615	9.9
Lake Shore & Michigan South	5,770	13.7	5,233	14.3
Pitts., Ft. Wayne & Pitts.	5,109	12.1	5,489	15.0
Chicago, St. Louis & Pitts.	6,264	14.9	5,113	14.0
Baltimore & Ohio	3,432	8.1	2,621	7.1
Chicago & Grand Trunk	2,007	11.8	2,155	14.1
New York, Chic. & St. Louis	2,987	6.9	2,008	5.5
Chicago & Atlantic	3,993	9.5	3,714	10.1
Total	41,985	100.0	36,591	100.0

Of the above shipments 1,664 tons were flour, 11,425 tons grain, 2,679 tons millstuff, 4,362 tons cured meats, 1,966 tons lard, 9,025 tons dressed beef, 238 tons grass seed, 1,165 tons butter, 932 tons hides, 201 tons wool, and 6,392 tons lumber. The two Pennsylvania lines carried 27.0 per cent., while the three Vanderbilt lines carried 31.1 per cent.